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TALENTED BEHAVIOR IN JUNIOR HIGH SCHOOLS.
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TO DETERMINE THE INTERRELATIONSHIPS BETWEEN THE SOCIETAL ENVIRONMENT AND EARLY LEARNING EXPERIENCES OF YOUNG PEOPLE WAS THE GOAL OF THIS PROJECT. THE MAJOR OUTCOME OF THIS RESEARCH WAS A WORKABLE FRAME OF REFERENCES AND SET OF TECHNIQUES FOR STUDYING AND TESTING IDEAS ABOUT TALENTED BEHAVIOR IN SCHOOL AND, EVENTUALLY, EXPERIMENTAL SETTINGS. ALL ELSE BEING EQUAL, TALENTED BEHAVIOR WAS FOUND TO BE BROUGHT ABOUT BY A COMBINATION OF INNATE AND ACQUIRED ABILITIES, AUGMENTED OR SUPPRESSED BY ELEMENTS OF PERSONALITY AND ATTITUDES TOWARD THE WORLD OF PEOPLE AND THINGS, AND FACILITATED OR MODIFIED BY THE EXPECTATIONS AND PRESSURES IMPOSED BY PEERS AND OLDER PERSONS. BUT TWO OTHER INFLUENCES WERE FOUND TO BE AT WORK. ONE WAS THE EXPECTATIONS AND PRESSURES ASSOCIATED WITH SEX ROLES AND THE OTHER INVOLVED THE CONTEXT OR SETTING IN WHICH LEARNING HAD TAKEN PLACE AND BEHAVIOR HAD OCCURRED. DETAILS IN THE REPORT VERIFIED THE MODERATING INFLUENCES OF SEX-TYPED DIFFERENCES AND THE EFFECTS OF DIFFERENT SCHOOL PROGRAMS. IN TERMS OF TECHNIQUES FOR STUDYING AND TESTING IDEAS ABOUT TALENTED BEHAVIOR, THE MOST VALUABLE CONTRIBUTION WAS THE DEVELOPMENT OF WHAT WERE TERMED "FACTOR VARIABLES" WHICH TURN OUT TO BE SURPRISINGLY STABLE AND VALID MEASURES. (JL)

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TALENTED BEHAVIOR IN JUNIOR HIGH SCHOOLS

Cooperative Research Project No. 025

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Summary Report

TALENTED BEHAVIOR IN JUNIOR HIGH SCHOOLS

A talent is a pre-eminent aptitude or a superior ability, either natural or acquired, or a capacity for achievement or success. In school settings, "human talent" refers not only to various kinds of scholastic aptitude and academic achievement, measured by objective instruments and evaluated by teachers, but also to other forms of behavior appraised by one's age-mates and older people. Thus talented behavior involves both personally-significant and socially-valued competencies, including signs of creativity, recognized as such through performances or products which can be assessed by other persons.

The basic assumption underlying this research is that, if factors such as innate ability be held constant, talented behavior is acquired and becomes organized, or structured, and to some extent predictable as a consequence of the educative process. Learning is a process whereby the potentialities and behaviors of human beings become differentiated and reorganized so that new kinds of performances are possible. Unless something out of the ordinary is done in guiding learning experiences, a process we term "telesis," the behavior of most individuals attains a crude stability or invariance which makes it predictable (Ferguson, 1954, 1956). What is needed most today is a thoroughgoing re-examination of learning experiences provided in schools (Chase, 1957) and a resolution of certain value dilemmas (Getzels, 1957) which impede the development of talented behavior. The alternative is limited educational attainment by potentially-able students (Dressel & Grabow, 1958) and a continuation of socially-unacceptable forms of behavior among adolescents (Havighurst, 1960; Hess & Goldblatt, 1957; Davis, 1957), both of which tend to reduce the pool of talent in schools and, later, in adult populations.

Overview of the Human Talent Project

What kinds of indicators or variables combine most effectively to explain and forecast talented behavior among boys and girls in the junior high school years? Are abilities relatively fixed or do some of them transfer and produce different outcomes from one stage of learning to another and from one kind of valued performance to another? To what extent can school people modify and enrich the educative process so as to foster and influence these changes? Which boys and girls respond to such opportunities and what are the characteristics of those who react negatively? In what ways are the learning experiences of students in junior high schools influenced by various kinds of grouping and by the enrichment of certain courses? How are different kinds of abilities and types of performances affected by variations in personality makeup and motivation, or by pressures imposed by age-mates, parents, and men and women teachers? Some answers to these and to related questions were sought in the Human Talent Project begun in 1957 with all boys and girls entering the seventh grades in the schools of four medium-sixed Texas communities. The project was designed to last three years until those who remained at the same school location had completed the ninth grade in the spring of 1960.

Two Phases of the Project

The Human Talent Project, officially termed "Factors Associated with Educational Utilization of Human Talent," was divided into two parts or phases. Part I, the subject of this report, was focussed upon the indicators or dimensions of talented behavior and the possible sets of variables which might be used to explain and predict various forms of behavior valued in junior high schools as they now operate. Members of the research team were concerned not only with modal patterns but also with similarities and differences in performances between boys and girls. We were particularly interested in observing the effects of various kinds of school programs. During the seventh grade, the students in one system were in completely self-contained classrooms, those in another were in a modified self-contained plan for instruction , and a third system had a completely departmentalized organization. In addition, the four school locations represented instances of "enrichment," "managed," "homogeneous," and "heterogeneous" types of grouping pupils for instruction (Otto, 1957). As the research progressed, the influences of different family backgrounds (Auld, 1952; Cohn, 1959) and the effects of age-mate acceptance and avoidance

(McGuire, 1956) became quite noticeable. Finally to follow up a study of the behavior and achievement of gifted children in a laboratory school (Haggard, 1957), we drew a sub-population of highly-intelligent boys and girls from the four school locations.

Part II, which is the subject of a separate report, involved some natural experiments carried out in school settings. Here the research team, and school people working with them, focussed upon ways and means of upsetting the kinds of predictions one ordinarily would make about talented behavior. Each educational telesis required the deliberate, purposeful utilization of planned variations in teaching and guidance processes, as well as certain kinds of school and intraclass grouping (Hindsman & Duke, 1960). Only a relatively small proportion of students in the four communities were selected for these natural experiments, so control groups were available to test the effects of each attempt to modify the educative process. School-wide modifications of curricula and procedures for grouping students were taken into account when data were analyzed and interpreted for this report.

Nature of Talented Behavior

Underlying the questions to be answered, and the two phases of the project, was a general proposition about the nature of talented behavior which, in effect, provided a research model. Talented behavior, as defined at the beginning of this report, was expected to be a function of:

(a) pertinent cognitive, perceptual, and psychomotor abilities (Bloom, 1956; Ferguson, 1956: Guilford, 1956, 1959: Wilson, 1958);

(b) elements of personality and motivation, especially expectations about one's behavior and the probable response of other persons to it (Atkinson, 1957; Sears, 1951; Stern, Stein, & Bloom, 1956);

(c) ways in which boys and girls are valued and have pressures imposed upon them by others such as parents, age-mates, and teachers in various settings (Elkins, 1958; Haggard, 1957; McGuire, 1956).

At least two kinds of modifying influence were hypothesized. The research group anticipated that the three classes of variables might combine in different ways for boys and girls as a consequence of sex-role identification and the sex-typing of socialization pressures upon males and females (Brown, 1958; More, 1955; Parsons & Bales, 1955). In addition, we looked for further variability among the four communities. Each location provided a somewhat different cultural context (Ferguson, 1954) and the patterns of educational experiences and expectations in the school systems were not the same (Goethals, 1958)

Working With People in Schools

The research had three important, rather obliquely related, action objectives. One was to demonstrate, not only to the academic world but also to laymen, the feasibility of a university and public schools pooling their efforts in gathering data and testing ideas. The communities were chosen with this purpose in mind after visits to and talks with administrators and influential persons at some twenty possible locations. To illustrate the degree of success, each school system budgeted funds for research purposes and provided for the expenses of teachers, counselors, administrators, and school board members who attended university-campus and local work conferences each summer.

These work conferences and the development of a pattern of consultation and exchange of information during the school year were undertaken to attain a second objective. The summer conferences and follow-up were designed to assist school personnel in acquiring fact-finding and fact-interpreting skills, and to encourage plans for the modification and the enrichment of their work with junior high school students. None of the natural experiments carried on as the second part of the project would have been possible without the full participation of self-selected teachers, counselors, principals, and supervisors. Together with project personnel and special consultants, they devised suitable adaptations of classroom and guidance procedures which were expected to lead to more effective development of talent among students in the schools.

The third objective was to interest and provide valuable learning experiences in educational research for an increasing number of faculty members and graduate students. They had a variety of opportunities to utilize or to acquire ideas and methods developed in the behavioral sciences, especially psychology, and test them out in educational settings with live subjects and professional co-workers. Most of the participants, including some of the special consultants, developed several hypotheses which they had opportunities to test. In addition, most of the faculty associates and members of the project staff had to learn to assume two roles and to be able to shift rapidly from one to the other. In one role, they were research persons administering instruments, observing what happened in classrooms, interviewing school people, or planning and working at the analyses of data in the Laboratory of Human Behavior or the University Computation Center. In the other role, they acted as consultants talking over problems, professional and personal, with the school personnel or as co-workers involved in a common undertaking.

Careful attention to these action objectives facilitated both the planning and execution of natural experiments and the gathering of data. As indicated by the summary statistics on the junior high school populations of the four communities in Appendix A, the project involved a large number of subjects. Between 1,400 and 1,500 boys and girls responded to each of the population-wide tests and other data-gathering devices, many in "make-up" sessions. The administration of instruments, described in Appedix B, was carried out largely by members of the project staff and faculty associates. Teachers and counselors in the four school systems gave valuable assistance. Using standardized instructions, they assumed the responsibility of administering some of the objective tests. As a result of this cooperative effort of school and university personnel, distributions of scores and index values on more than 50 variables for 1417 boys and girls were available at the close of the seventh-grade year.

Processing a Wealth of Information

Frankly speaking, the research team faced a monumental task of organizing, processing, and making sense of a wealth of data gathered in the three years, from the early fall of 1957 to the late spring of 1960. Decisions as to what tests were to be administered in the seventh grade were made by a committee of faculty associates in the spring and summer of 1957. Each judgment involved a careful examination of tests and review of the literature on them in the light of the objectives of the research (see Appendix B for details). During the summer and early fall of 1957, the committee and project staff revised certain tests for use with early adolescent boys and girls. At the same time, we prepared new devices such as the stimulus-items for nomination instruments described in Appendix C. The instruments which we selected, revised, and constructed as potential indicators and criterion measures of talented behavior yielded 140 different scores and index values, including subscores of test batteries.

Data Reduction and Analyses

By means of procedures described in the appendixes to this summary report, variables judged to be most pertinent to the study of talented behavior in the junior high school years were identified. We used IBM cards and, later, tapes to organize and store data. The acquisition and development of programs for the IBM 650 computer permitted us to process and analyze a large amount of information after it was suitably organized. For example, programs were written for such basic processes as transforming the original values punched on cards after scoring into another deck of cards with stanine values. On the one hand, the use of stanine values "1" to "9" with a mean "5" allowed us to print out by machine a large amount of agreed-upon information in a coded form about each boy and girl to be sent back to the school systems. On the other, the reduction of raw data to stanine values facilitated complex multivariate analyses using the IBM 650 equipment. As a result of a series of pilot studies, we made a number of decisions and the variables described in Appendix D were retained as potential indicators and criterion measures of talented behavior.

Then the most stimulating and productive steps in the processing of the data began. By means of a series of factor-analytic studies, we were able to map out the different ways in which the variables combined to sort out and portray achievements, abilities, and attributes. This was done not only for the seventh-grade population but also for boys and girls separately and according to school location, levels of intellectual functioning, types of peer acceptance, and kinds of family backgrounds, as shown in Appendix E. Using similar procedures, described in Appendix F, we sorted out the meanings of 46 kinds of descriptions age-mates made of one another in response to the nomination items. The analyses indicated that five sociometric factors were common to boys and girls and that five more were specific to each sex role. Consequently we could use a small number of factor scores to represent appraisals by peers.

Two complementary techniques, multiple regression and factor analysis, were employed to identify the significant dimensional variables, or indicators of talented behavior, and to reduce them to an even smaller number of meaningful factor variables. As shown in Appendix G, multiple correlation coefficients ranging from R = .75 to R = .86 were obtained to represent the strength of relationships between criterion measures, such as GPA teacher evaluations, CAT achievement, and STEP comprehension tests, and various combinations of the 32 indicator variables for boys and girls in the four communities. Measures of the strength of association between criteria and indicators of talent were not quite so high when data were combined across communities for the two sex roles and for the total population. Nevertheless, the analyses almost invariably explained 50 per cent or more of the variation in the different kinds of valued performances (R = .71 or greater).

The results encouraged us to take the next step, that of reducing the 32 promising indicators to a smaller number of factor variables which could more effectively explain, yet still predict with some precision and confidence, different kinds of talented behavior. This was our solution to the problems of differential testing and prediction (Michael, 1957). By means of factor analyses, we sorted out five factors "common" to boys and girls, two "specific" to each sex, and two "provisional" ones in the total population. As explained in Appendix H, the multiple-regression method was used to determine the optimal weights for the component indicators of each factor variable. Then new sets of factor scores were computed for each person who had completed instruments administered in the seventh grade.

Stability and Validity of Factor Variables

The explanatory and predictive values of the factor variables were explored by determining their relative weights for and strength of association with two kinds of criterion measures, academic achievement add age-mate appraisals. As shown in Appendix H, the weights attached to the factor variables for each of the criterion measures were different for teacher evaluations, the several kinds of objective tests, and the various appraisals. Nevertheless, within each set for a criterion, the loading magnitudes of the factor variables were significantly similar from grades VII to VIII to IX for boys, for girls, and for the total populations studied in all the tests we could make. In other words, the seventh-grade factor variables turned out to be "a much more standard article" than different sets of test scores with fluctuating meanings and significances (Guilford, 1954, p. 524).

Another short cut completed our tests of the validity of factor variables since we did not have time for cross-validation studies. This was a test of shrinkage (Appendix H, p. 16). In grade VII, the sets of factor scores were not as strongly related to the criteria of talent as were the separate sets of indicators. Instead of shrinking, however, the multiple correlations for the predictions of performances in grade IX ($R = .68$ to $R = .79$) either remained similar to or increased significantly over those in grade VII. The only exception was STEP Science where forecasting efficiency decreased significantly, for example, from $R = .71$ to $R = .66$, for total population.

An explanation of the lack of expected increases for STEP Social Studies, and two significant decreases in STEP Science for grade IX, was sought in Table D-1 which summarizes distribution statistics and reliabilities for variables (Appendix D). Apparently one reason was that the advanced forms 2A of the STEP tests of comprehension differed from the intermediate forms 3A and 3B used previously. Coefficients indicating resemblance among scores over three years for STEP Science ($r_I = .22$) and for STEP Social Studies ($r_I = .31$) were much smaller than for the CAT criterion measures. Moreover, for STEP Science, the coefficient of stability of performance over two forms ($r_{pp} = .45$) was very low. In spite of the changes in criterion measures, the factor variables served to explain a significant and substantial portion of the variation in performances on the STEP instruments andshowed improved multiple correlations for the advanced CAT tests of achievement.

From the foregoing analyses, we concluded that factor variables were reasonably valid and stable measures which served to explain a large proportion of the variations in several kinds of talented behavior, both academic and non-academic. Therefore, as shown in Appendix I, many of the same procedures were used in a study of 213 highly-intelligent boys and girls drawn from the four school locations. The methods of data reduction and analyses yielded a set of results which are summarized and discussed under pertinent headings in the sections to follow.

Talented Behavior in Boys and Girls

The factor variables provide a convenient means of explaining some modal patterns of talented behavior found among junior high school boys and girls. By modal patterns, we mean combinations of abilities, attitudes, expectations and pressures which most effectively describe some of the observed variations in valued performances regardless of differences from one school location to another. For a given criterion of talented behavior, such as grades assigned by teachers to pupils for the "content" courses in a given year (GPA Teacher Evaluation), there may be modal patterns for boys, for girls, and for both sexes taken together (total population). The modal patterns found in this study of junior high school students in Texas are summarized in Table 1, made possible by the series of analyses and tables in Appendixes G and H. Table 1 has been placed immediately after the last page of this report and before the abstract which precedes the appendixes.

Description of Factor Variables

A total of eleven factor variables appear in Table 1. They are composites of a larger number of potential indicators of talent derived in Tables G-8,G-9, and G-10, with optimal weights for indicators shown in Table H-1. The five common to both sexes are described briefly.

A. Cognitive Approach.- Efficiency in attending to and concentrating

upon verbal stimuli during the learning process (STEP Listening); recognition of appropriate answers to problems involving spatial relations, verbal concepts, logical and numerical reasoning (CTMM); ability to shift the function of a part of an object and use it in a new way (Gestalt Transformation); capacity to visualize and formulate complex conceptions from figural materials. (DAT Mechanical Reasoning); five other indicators have much smaller weights.

B. Divergent Thinking. - Ability to think in different, less goal-bound directions demonstrated by going beyond what is given and extrapolating outcomes (Consequences), awareness that problems exist (Seeing Problems), and calling up as many ideas or responses as possible in a given time (Common Situations).

C. Socially-Oriented Achievement Motivation. - Acceptance of school and cultural standards (JPQ 8); scholastic motivation, accompanied by effective study habits and attitudes (SSHA); representing oneself as a stable, confident person (JPQ 3); four additional indicators.

D. Peer Stimulus Value. - Acceptance by one's peers (party with, like to be like, work with on a school problem); expected to be an effectively-functioning person (enjoys everything, self confident, shows initiative); seldom regarded as a quiet, dependent individual.

E. Absence of Negative Valuations. - Not necessarily recognized or accepted by age-mates but seldom named as a negative model (not like to be like, not ask for help, not party with); seldom nominated for deviant behavior (dislikes school, has to be told, gets by).

The next four factor variables are specific to boys and girls as shown by the analyses summarized in Tables G-9 and G-10 of Appendix G. Two were identified for each sex and each can be described concisely.

F. Anxious Emotionality (Boys). - Self reports indicate "a motive to avoid failure," especially in ego-involving, threatening, or stressful situations (CMAS Anxiety); misperception, inability to cope with pressures, lack of a sense of identify (CYS Maladjustment); emotional sensitivity (JPQ 1); reacts emotionally (JPQ 3).

G. Antisocial Wariness (Boys). - A set to accept authoritarian atti-

tudes and awareness of the control exerted by authority figures (CYS Authoritarian); somewhat alienated from others (CYS Negative Social Orientation); negative toward teachers and critical of what is expected in school (CYS Criticism of Education); perceives symbolic materials quickly, even from partial clues (Short Words, Mutilated Words).

H. Sensitive Dependency (Girls). - Expresses authoritarian attitudes and accepts control of authority figures (CYS Authoritarian); emotionally sensitive, tender-minded (JPQ 1); complies with most school and cultural standards (JPQ 8); quiet, serious (JPQ 11).

I. Perceptual Defenses. - Originally named "Perceptual-Motor Skills" but reinterpreted; identifies objects with parts missing (Gestalt Completion); careful to represent self positively (CYS Neg. Soc. Orientation); quick and careful reactions (Dotting, DRT).

The remaining two are provisional variables identified in the factor analysis of indicators for the total population (Table G-8) and assigned optimal weights in Table H-1 of Appendix H. As shown in Table 1, the part they play in explaining different aspects of behavior unfortunately only has been calculated for grades VII and VIII. Neither of them are correlated with factors obtained for boys or girls separately, so the attributes they combine are not linked to either sex role.

J. Practical-Minded Toughness. - Represents self as tough-minded and scoffing at emotions (JPQ 1); probably has mechanical experiences and responds to practical problems (DAT Mechanical); lacks the ability to perceive and cope with symbolic materials (Mutilated Words), low speed of closure on word units (Short Words).

K. Anxious-Dependent Resentment.-Self reports indicate underlying anxiety (CMAS Anxiety); expresses authoritarian beliefs (CYS); distrustful, egocentric, and resentful (CYS Neg. Soc. Orientation); excitable and would like variety (JPQ 11).

Estimated Modal Weights

Estimated modal weights for each of the foregoing factor variables are entered in Table 1 for different kinds of criterion measures of talented behavior during the junior high school years. A "modal weight" is the estimated contribution which a factor variable makes toward the explanation and/or prediction of some kind of valued performance over a specified period of time for a specified population. The loading magnitudes should not be confused with correlation coefficients. They are multipliers or beta weights of sets of factor socres for persons which yield the most efficient explanation of a specified kind of behavior. Thus the weights for factor variables may be viewed as being relative to one another for a given criterion measure and comparison of factor contributions can be made across different types of evaluated behavior.

The modal weights shown in Table 1 have been estimated from the original data on boys, girls, and both together in the total population shown in Tables H-2 to H-6 of Appendix H. Whenever the data were available, values have been averaged over three years. In each instance of a significant change in loading magnitudes, from zero to a substantial weight or a shift in signs, two entries have been made in the table. The first entry in parentheses represent the weight for the factor variable in grades VII or VIII and the second is the regression upon the criterion measure obtained for grade IX. Thus changes over time, due either to shifts in behavior of boys and girls with age and learning experiences or to differences in successive forms of a criterion measure, readily can be identified.

The efficiency of each set of factor variables for the explanation of a particular kind of talented behavior may be determined by reference to the range of multiple correlation coefficients also entered in Table 1. As indicated earlier, the multiple R values for the factor variables generally are not as high as those obtained in a study of the regression of criterion measures upon varying sets of a larger number of indicators (Table G-7 in Appendix G). Nevertheless, by grade IX, their efficiency approaches that of the indicators in grade VII in most instances. The unexplained variance probably is due to: (a) changes in the abilities, attributes, and expectations of boys and girls with age and new opportunities to learn, not represented in grade VII factor scores; (b) factors contributing to talented behavior not as yet identified; (c) imperfections in and lack of comparability of criterion measures, such as the STEP instruments, used from one year to another; and (d) errors of measurement (see Table D-1 in Appendix D for reliabilities).

Teacher Evaluations (GPA)

Do teachers, when they allocate marks or grades in content subjects, evaluate boys and girls in the same manner? Are the characteristics of males which make for recognition of quality of school progress the same as those for "high achievers" among females in the junior high school years? In terms of the modal patterns in Table 1, the answers apparently are a qualified "no" in both cases.

By and large, junior high school teachers seem to recognize and reward divergent types of thinking on the part of girls but not boys. All else being equal, girls who achieve high grade point averages tend to think in different directions, sometimes searching and sometimes seeking variety (Guilford, 1959). Nevertheless their ability to recognize and give "one right answer" and their acceptance and efficiency as persons both are necessary to become "high achievers" in the judgments of teachers. For them, qualities we have identified as "perceptual defenses" are something of a liability. On the other hand, boys appear to be evaluated equally in terms of their cognitive abilities and their stimulus value as effectively-functioning individuals. Like the girls, who perform most effectively in terms of teacher assessments, they seldom are regarded negatively by age-mates. Finally, there is some evidence that males have to study harder or show more concern about matters academic than do females.

The modal pattern for boys and girls taken together is something like an average of the factor weights for the two sex roles. Based upon the analyses for grades VII and VIII, the two provisional factor variables have some explanatory value for a total population. Any evidence of what we have termed "practical-minded toughness" on the part of a boy or girl seems to impede academic progress or, alternatively, is counted against the student in teacher evaluations. To a certain extent, a combination of anxiety, alienation, and authoritarian attitudes also tends to have a negative affect upon grade point averages achieved by junior high school students.

Standard Tests of Achievement (CAT)

As criterion measures of performances in basic subject areas for the junior high school years, three California Achievement Tests have been used with different forms for each grade. The battery is one of a number of standard tests of achievement. In this project, their reliability if high and the coefficients of resemblance among scores of individuals over two intermediate and one advanced forms all are significant and larger than anticipated (Table D-1, Appendix D). Analyses in Table 1 indicate that performances on these tests of basic knowledge and skills are highly dependent upon abilities grouped together in the factor variable we have termed "cognitive approach," but not to the same degree for each measure of talented behavior.

Quality of performance on CAT Reading is most influenced by the composite "cognitive approach." Among the CAT measures, the relation between intellectual qualities and reading achievement is least affected by other attributes and pressures. Patterns of modal weights for the five factor variables common to both sexes are reasonably similar with certain minor exceptions. Boys with good reading vocabulary and comprehension tend to be somewhat more motivated to learn and respected by age-mates through the three junior high school years than girls. By grade IX, boys who excel have some fear of failure which augments their quick, sometimes wary, perception and cognitive skills. Girls with highest scores in the ninth grade more frequently are individuals not noticed by their peers. In the total population, students with the negative attitudes and the inability to deal with symbols represented in "practical-minded toughness" seem to be handicapped in reading achievement.

In CAT Language, the patterns for the two sexes show some intriguing differences. Among male "high achievers," cognitive abilities are augmented by an expressed willingness to work hardand comply with school expectations, some recognition among peers, and the awareness of rules and quick perception of symbolic meanings implicit in the indicators of what we have termed "antisocial wariness." Females who excel are more capable than boys of thinking divergently and, by the ninth grade, are the more stable, academically-motivated persons among those of their sex. By and large, girls who do well on this test of the mechanics of English and spelling have the respect of their age-mates or, at least, are not regarded as undesirable or deviant in their behavior. In the total population, the kinds of behavior which make up "practical-minded toughness" have the highest negative modal weight in the table. In other words,individuals who are tough-minded, oriented toward practical problems, and have not learned to cope with symbolic materials are unable to do well upon tests of language achievement no matter what their other aptitudes and attributes may be.

By the ninth grade, boys and girls who excel in the mastery of fundamentals and numberical reasoning which make up CAT Arithmetic have remarkably similar patterns of modal weights for the factor variables. Abilities combined in "cognitive approach" are enhanced by being an accepted, effectively-functioning individual who is capable of casting about for solutions. The picture presented in terms of modal weights is not unlike that found by Haggard among his "high general and high arithmetic achievers" (1957, p. 401). Prior to the ninth grade, however, boys who do well on the test of number skills are somewhat different. They appear to be subject to yet wary of authority, critical of school yet capable of dealing with symbolic materials, and inclined to seek the "one right answer." As on the other standard tests, persons with high factor scores on "practical-minded toughness"apparently are unable to deal with the abstract, symbolic material.

Measures of Comprehension (STEP)

The two Sequential Tests of Educational Progress used as criteria of talented behavior are measures of the ability to comprehend and to draw conclusions about realistic problem situations. They primarily are power rather than speed tests. The modal values representing relative contributions of factor variables to STEP Social Studies and STEP Science in Table 1 are based upon performances on different forms. They are 3A and 3B for junior high school students in grades VII and VIII, and form 2A for senior high schools in grade IX. Apparently the

differences between intermediate and advanced forms of the STEP instruments, especially Science, are greater than for comparable forms of the CAT battery. Despite the lower than expected equivalence between forms found in this project (Table D-1, Appendix D), the factor variables still have substantial explanatory efficiency by the ninth grade.

Abilities and aptitudes combined in the first factor variable, "cognitive approach," explain a very large proportion of the variation in performances on STEP Social Studies. Nevertheless, these potentialities can be augmented, modified, and suppressed by other attributes and pressures represented by the remaining factor variables. The patterns of modal weights for males and females are quite similar with only one apparent exception. To excel on the advanced form, the girls who do so in grade IX have to be more stable, socially-oriented, and motivated academically than they were in earlier years. Again the tough, practical individual who has not learned to deal with symbols and think in those terms is penalized.

Apart from the heavy loading magnitudes of the modal weights for "cognitive approach" in the explanation of performances on STEP Science, there are some interesting reversals in Table I. Boys who do well on the advanced form more frequently are individuals who are able to think in different, less goal-bound directions and who seem to be relatively independent of age-mate pressures. Probably suitable measures would show them as being more academically competitive since "socially-oriented achievement motivation" has decreased substantially to a zero weight. The girls present a picture which calls to mind the person adolescents describe as a "brain" (McGuire, 1956). By grade VIII, the attributes combined in "practical-minded toughness" no longer suppress other potentialities in so far as comprehension of problems of a scientific nature are concerned.

Age-Mate Appraisals

Some examples of age-mate appraisals as criterion measures of talented behavior are included in Table 1. Distributions of values for Nom Talented are derived from nominations by age-mates of persons

"who have some hidden ability" or "who have a great deal of talent." Those for Nom Athletic (boys) represent persons "who are really good in athletics and sports." For Nom Rhetoric (girls), those named have a "lot of ability in dealing with words" or are "outstanding speakers or writers." Reliabilities from one administration to another, computed for community B, are very high (Table D-1, Appendix D). IPS Peer Status (total population) is a measure of age-mate acceptance and avoidance derived from sociographic representations of group structure, explained and illustrated in Appendix J.

The factor variable "peer stimulus value" has a very high modal weight for each of the age-mate appraisals, the loading magnitudes being considerably higher than for teacher evaluations. Girls named as being talented persons also tend to have cognitive abilities. Although some peers regard them negatively, the majority recognize their social stimulus value, initiative, and confidence. Girls nominated for rhetorical ability have much the same qualities but they less frequently are disliked or looked upon as deviants.

Boys who are regarded as talented individuals usually have some capacity for divergent, less goal-bound thinking in addition to "peer stimulus value." Fewer boys than girls so nominated are looked upon as being different. The pattern for athletic boys is what one might expect, prowess in sports and recognitions among age-mates being almost equated and slight negative weights being attached to intellectual qualities.

Although the factor variables explain only 25 per cent of the variance in indices of peer status, the pattern of weights is instructive. Apparently acceptance and avoidance among age-mates involves something more than "peer stimulus value"and not being disliked or regarded as a deviant by one's peers. Intellectual qualities have a small negative relation to the index values but the composite of indicators making up "socially-oriented achievement motivation" has a positive weight. A greater proportion of the variation in IPS values might have been explained if "practical-minded toughness" and "anxious-dependent resentment" had been included among the factor variables.

In summary, the ways in which the sets of factor variables combine vary according to the criterion of talented behavior. In most instances, the patterns differ for boys and girls. Two factor variables tend to have high relative loading magnitudes; namely, "cognitive approach" for the standard tests of achievement and measures of comprehension, and "peer stimulus value" on the case of age-mate appraisals. Both are represented in teacher evaluations. The other factor variables serve to augment, modify, or suppress the ones with major weights. For example, "practical-minded toughness" lowers the quality of performance on all of the school-related criterion measures with the exception of STEP Science in grade VIII. Finally, in most instances save IPS Peer Status, the combinations of factor variables not only are significant but explain a very substantial proportion of the variation in the several kinds of criterion measures.

Effects of Different School Programs

To some extent the modal patterns for boys, for girls, and for a total population of junior high school students should be questioned becuase they disregard differences from one community to another. A careful examination of Tables H-2 and H-5 in Appendix H would lead one to infer that weights attached to factor variables for the different kinds of criteria of talented behavior vary from one school location to another as well as for males and females. This is true both in grade VII and in grade IX, the two analyses giving details by communities.

We propose to show that the variations among communities may be linked, at least to a reasonable degree, with the effects of different school programs. As categorical variables, the four school locations have been described in Appendix D (pp. 11-12) in terms of cultural contexts and types of school organization. Briefly stated, the major differences among the school programs can be characterized as follows:

A. Community A. - In grade VII, all but the Negro students were housed in one large junior high school, the relatively small number of colored pupils being in a separate junior-senior high school. The organization for instruction was based upon what was termed the modified self-contained classroom plan. The homeroom teacher was responsible for the academic subjects (English, social studies, mathematics) and the students went to special teachers for electives.

In grades VIII and IX, the plan of grouping for enrichment was adopted. Based upon teacher nominations, the study of printouts of tests results by the principal and others, and conferences with parents and the boy or girl, students were assigned individually to enrichment sections of a particular course in one or more of the academic subject areas. For example, a particular student could be in an "enriched" section for mathematics, "regular" classes for social studies and science, and a "basic" course for English.

B. Community B.- In grade VII, students were in self-contained classrooms with one teacher for all subjects. They were located in five different elementary schools and a junior-senior high for colored students.

In grades VIII and IX, all students were housed in three grade junior high schools since a new one had been constructed. Assignments of boys and girls to classes involved managed grouping. For example, in junior high M, care was taken to see that each section had a mixture of pupils from different family backgrounds and representing several kinds of peer status (accepted, avoided, rejected, isolated). Thus there were models to imitate (Otto, 1959) and cliques were broken up. Members from two "blocked" homerooms stayed together while going from teacher to teacher, whereas those from "mixed" homerooms were assigned individually to sections. In junior high N, students of "independent" and "dependent" orientations were assigned in various ways to subject teachers regarded as "modern" and "traditional" for a series of natural experiments. Other students were unaffected by the experiment in grouping which was proposed by the school people themselves (Hindsman & Duke, 1960).

C. Community C.- From grades VII to IX, all students attended junior high schools, the Negro pupils being integrated by the ninth grade. The organization for instruction was departmentalized for each subject throughout the three years. During the seventh grade, one junior high had pupils grouped alphabetically, a device which served to place Latin-American pupils together more frequently than one would expect. After the seventh grade, this school adopted the plan of ability grouping followed from the first year in the other junior high school. Using CTMM scores, students were placed together in "high-high," "high," "high-average," "average," "low-average," "low," and "low-low" groups for assignments to the subject sections (Hindsman & Duke, 1960).

D. Community D.- In grade VII, the majority of students in this integrated system were in a large junior high school with instruction organized according to the departmentalized plan. At a small junior high in a neighboring community, the pupils remained in the same classroom but had different subject teachers. Those in elementary schools of two other small communities were in self-contained classrooms with one teacher. Later, they came by bus to the large junior high school in the main community.

By and large, the plan followed in community D was regarded as an example of heterogeneous grouping, although there was some attempt to group students by quartiles on CAT Reading Comprehension for instruction in the English and Social Studies sections during the eighth and ninth grades. As in all schools, there were some "experimental" and "control" sections for phase II of the project during the ninth grade. Consultants in English, mathematics, social studies, and science worked with the "experimental" teachers.

The different types of organization for instruction in the seventh grade apparently have some discernible consequences. Probably the most important information on the effects of different school programs is contained in Table E-4 (Appendix E). The table has four columns showing the factor structure of 50 different measures obtained during the first year of the project for the four school locations. In the series of analyses to map or sort out relations among the 50 variables, including both criterion measures and indicators of talented behavior, ten factors have been identified. For convenience, they have been given names descriptive of the measures most frequently loading on them across the table. The names of the factors are: (A) Scholastic Achievement, usually defined by tests of achievement and comprehension; (B) Academic Grades, defined by grades teachers assign in school subjects; (C) Divergent Thinking, as in the factor variable; (D) Socially-Oriented Achievement Motivation; (E) Ineffectively-Functioning Personality; (F) Social Alienation; (G) Perceptual Closure; (H) Peer Recognition; (I) Deviant Age-Mate Behavior; and (J) Active Conformity.

The factors sort out very differently for community B than in the other school locations. This may be related to the fact that,in grade VII, students were assigned to self-contained classrooms, each with one teacher, in five separate elementary schools and a colored junior high. Among seventh-grade students in community B, the measures which usually map out into "scholastic achievement," "academic grades," and "perceptual closure" all are combined in one factor. The indicators of what we have called "divergent thinking" also load out on the global factor. An additional portion of what these tests represent separates out in factor C associated with teachers grades for English and social studies. Factors D and E are combined so that "socially-oriented achievement motivation" is polar to "ineffectively-functioning personality" and some teacher grades have appreciable loadings in this combination.

Some inferences can be made from the very different factor pattern identified in community B. The grades assigned in school subjects are closely related to objective measures of achievement, cognitive abilities, perceptual skills, and study habits and attitudes. Divergent thinking seems to be encouraged and rewarded in terms of grades for English and social studies. Effectively-functioning, motivated pupils tend to receive higher marks in social studies and mathematics, whereas the maladjusted ones do not. Apparently, in such self-contained classrooms, teachers live with and learn to know their students. School achievement, cognitive functioning,and psychological health become more closely associated (Jackson, Getzels, & Xydis, 1960) than in other forms of organization for instruction.

The extreme of departmentalized organization for instruction in grade VII occurs in community C. This is the only school location in which all ten factors are clearly separated from one another. To some extent, the teachers are objective in their grading of students (factor

A) but, to a much larger extent, the marks assigned appear to be personal judgments (factor B). This is not true in community A, which had a modified self-contained plan for instruction, nor in community D, with a mixture of the three plans. Closer inspection reveals a number of other differences as well as some similarities among the factor patterns for the four school locations. The point we want to make is that the self-contained, modified self-contained, and departmentalized types of organization apparently provide quite different climates for learning and each has discernible effects upon students and teachers.

The assessment of the consequences of different ways of grouping students for instruction is a topic for phase II of this project. In this report, descriptions of the four approaches to grouping--enrichment in A, managed in B, ability in C, and heterogeneous in D--have been included to provide a background for understanding in the variations from one school to another in tables such as H-5 of Appendix H. Despite the different school programs, an examination of the table shows that sets of factor variables have remarkable predictive power from the seventh to the ninth grades. Although the weights for the different factor scores vary from one community to another, the multiple correlations within the communities generally are as high or higher than for the combined populations of the four school locations. This means that some kind of provision has to be made to take account of the effects of different kinds of school programs if one is to understand and predict various forms of talented behavior more precisely.

Influences of the Family and Age-Mates

By and large, we have been frustrated in our attempts to measure and assess the influences of the family upon talented behavior. Only an index of social status (ISS) has proved to be of some value. None of the relevant CYS scales--family problems, resentment of family life style, family tension, resentment of dependency--have turned out to be useful. What they measure seems to be included in the other Texas Cooperative Youth Study scales (Holtzman & Moore, 1960) which have been referred to in the description of the factor variables. On the other hand, we have had highly gratifying results in determining age-mates influences.

Family Backgrounds and Their Effects

Two variables, ISS Family Status and CYS Family Tension, occur in the factor-analytic studies of 50 measures retained after pilot studies had been completed (Table E-4, Appendix E). In general, ISS Family Status has its highest loadings as part of the first complex, factor A, "scholastic achievement." One would infer from this that differences in social class do have some bearing upon academic performances. CYS Family Tension turns out to have its highest loadings upon factor E, "ineffectively-functioning personality." Since CYS Personal Maladjustment accompanied it each time, and had even higher loading magnitudes, CYS Family Tension has been dropped from the list of indicators considered in the development of factor variables.

The influence of family status (ISS) upon several kinds of cognitive and noncognitive behavior has been studied in two ways in Appendix E. Analyses of variance (Tables E-1 and E-2) show that family background has a bearing upon performances in CAT Reading, Mechanics of English, and STEP Science independently of sex role, level of mental function, or school location. These and other findings in the two tables justify our factor-analytic studies of students classified according to family status summarized in the last three columns of Table E-4. The headings may be interpreted as follows: HFS, upper, upper-middle, and middle-middle class; AFS, lower-middle and upper-lower class; LFS, lower-lower class family backgrounds.

The factor structures of the 50 variables for junior high school students in the HFS, AFS, and LFS categories are worth more than cursory attention. Only six factors are required to map the relationships among the variables for LFS pupils, nine to sort AFS behavior on the tests, and nine (not the same) for the HFS students. Teachers apparently grade HFS pupils in terms of cognitive abilities, facility with symbols, and scholastic motivation. Marks assigned to high status boys and girls generally are in agreement with performances on standard tests of achievement and comprehension. This apparently is not true for lower-middle or lower-class students since the highest loadings for different kinds of grades assigned by teachers are in factor B, "academic grades," and not in factor A, "scholastic achievement." Other interesting differences among HMF, AMF, and LMF students are apparent after further study of the table. One would infer that the cultural differences and variations in learning experiences associated with being brought up in different kinds of family backgrounds have some complex consequences yet to be disentangled.

Age-Mate Acceptance and Avoidance

As explained and illustrated by the figures in Appendix J, the group structure of persons about the same age and in the same grade have been studied each year by means of sociographs constructed to represent their positive and negative valuations of one another. From sociographs such as those illustrated, we have determined five categories of peer acceptance; namely, accepted (Acc), ambivalent (Amb), avoided (Avo), rejected (Rej), and isolated (Iso). Factor-analytic studies have been carried out with students allocated to each of these categories as the subject (Appendix E).

The factor structure of the 50 variables for junior high school students according to categories of peer acceptance in Table E-4 also is worthy of some attention. For example, isolated boys or girls who excel in tests grouped in factor A, "scholastic achievement," often are regarded by age-mates as brains and represent themselves on JPQ 6 as being sociable persons. As another instance, the syndrome of CYS Authoritarian, Criticism of Education, Negative Social Orientation, and CMAS Anxiety, forming factor F, "social alienation," is most clearly defined by high loading magnitudes among the isolates and rejected ones, followed by those regarded ambivalently. Thus the factor analyses summarized in Table E-4 of Appendix E and the illustrative sociographs which form Figures J-1 to J-6 in Appendix J reveal a good deal about the nature of age-mate relationships, expectations, and pressures.

Sociometric Factor Variables

Two of the very important factor variables discussed earlier in the section on talented behavior in boys and girls, Peer Stimulus Value and Absence of Negative Valuation, have been derived from a set of five sociometric factor variables. These in turn have been developed from a factor analysis of 46 original nomination items by means of which boys and girls at each school location assessed one another's behavior and attributes (Hindsman, 1960). The details of the factor analyses, the matching of factor variables for girls and boys, and steps taken to validate the new second-order sociometric variables are set forth in Appendix F.

To summarize, the series of analyses described in Appendix F and Tables F-1 and F-5 have yielded five sociometric variables common to both boys and girls and five specific to each sex. Three of the common factors, "peer acceptance," "social effectiveness," and low values for "quiet dependency," combine to make factor variable D, Peer Stimulus Value. The other two common to both sex roles, "absence of negative model value" and "nondeviant vs. deviant behavior," are weighted in the composite factor variable E, Absence of Negative Valuations. Only a look at the weights attached to these two factor variables in Table 1 is necessary to realize the part played by the expectations of, and pressures often imposed by, one's peers in the explanation of talented behavior. That the nomination variables are measuring attributes valued by teachers is quite evident in the modal weights for GPA Teacher Evaluation.

Attributes of Potentially-Gifted Students

To follow up a report upon the behavior and achievement of gifted children in a laboratory school (Haggard, 1957), we have undertaken a study of highly-intellitent students selected from the four communities. The details of this study and supporting tables may be consulted in Appendix I. We have elected to summarize and present the findings in Table 2 which shows the estimated modal weights for a new set of HMF factor variables with most of the same criterion measures employed for the general population of junior high school students. Table 2 has been placed immediately after Table 1 following the text of this summary report.

HMF Factor Variables

The subjects were 213 students, 120 boys and 93 girls, all with CTMM scores one standard deviation above the mean (IQ 113 to 140) drawn from the four school locations. Of those studied in the seventh grade, only 102 subjects, 53 boys and 49 girls, remained in the same school location and completed all instruments by the end of the ninth grade. As shown in Tables I-1 to I-4, a set of factor variables was derived for this high mental function (HMF) population, using the same procedures as for the total population.

1. Personal Stability. - High stability or ego strength (JPQ 3); low fear of failure (CMAS Anxiety); cooperative, restrained, and able to communicate (JPQ 9); five additional indicators.
2. Divergent Thinking. - Ability to think in different, less goal-bound directions marked by ideational fluency (Common Situations); conceptual flexibility (Consequences); awareness that problems exist (Seeing Problems); some originality (Unusual Uses).
3. Convergent Thinking. - Ability to channel thinking to one unique conclusion by means of eduction (DAT Mechanical); comprehension (CTMM); redefinition (Gestalt Transformation); and attention to verbal stimuli in the learning process (STEP Listening).
4. Symbol Aptitude. - Rapid recognition of symbolic units (Short Words); facility with verbal material (Rhymes); perception of symbols when given only partial clues, symbolic closure (Mutilated Words).
5. Conforming Behavior. - Absence of negative valuations by age-mates (Nom 2); acceptance of authoritarian beliefs and awareness of controls by authority figures (CYS Authoritarian); seldom regarded as deviant in behavior by peers (Nom 4).
6. Age-Mate Acceptance. - Acceptance by one's peers as a person to be like or be with (Nom 1); expected to be an effective, mentally healthly person (Nom 3); a sense of identity (CYS Maladjustment).
7. Antisocial Attitude. - Tough-minded outlook (JPQ 1); critical of school and teachers (CYS Criticism of Education); seldom regarded as a quiet, dependent individual (Nom 5); somewhat alienated from

other people (CYS Negative Social Orientation).

Talented Behavior in Highly-Intelligent Students

Estimated modal weights for each of the foregoing factor variables have been entered in Table 2. The meanings and interpretations are the sameas explained for the study of the general population of junior high school students in Table 1. The only differences are that the modal weights in Table 2 are for a new set of HMF factor variables and they have been estimated from entries in Tables I-8, I-9, and I-10 for grades VII, VIII, and IX, respectively, in Appendix I.

The efficiency of the new set of HMF factor variables, as measured by the multiple correlation coefficients for each criterion measure and year, is somewhat lower than for preceding analyses. One reason is that many of the distributions for variables used in the computations have a restricted range for the highly-intelligent students. All computations are based upon the original stanine values the subjects received for each measure, the pressure of time preventing the calculation of a new set of stanines for the HMF population. Nevertheless, all of the multiple R values are significant and represent a substantial proportion of the variance in the criterion measures. Moreover, the strength of the relationship between the criteria of talented behavior and the set of HMF factor variables increases, with few exceptions, from grade VII to grade IX.

Among the potentially-gifted students, GPA Teacher Evaluations for boys depend upon a different combination of factors than for the girls. For the males, attributes which peers assess in "age-mate acceptance" have a surprisingly high modal weight and "conforming behavior" seems to be rewarded. Cognitive abilities account for a relatively low portion of the variation in teacher marks. Being a stable person low in anxiety, on the one hand, or having an antisocial outlook, on the other, can suppress teacher assessment. Among the females, however, aptitude with symbolic materials appears to be relatively most important, followed by the stimulus value and efficiency as a person which peers regard highly. Conformity is not so necessary and thinking divergently has a higher weight than for males. In girls, unlike boys, "personal stability" is prized but "antisocial attitude" can be more detrimental to the grade point averages allocated by teachers.

In CAT Reading, "convergent thinking," "symbol aptitude," and the qualities assessed by peers in "age-mate acceptance" combine to account for a large proportion of the variation in performances among the HMF students. Among males, attributes combined in either "personal stability" or "antisocial attitudes" can depress scores on the test and, by the ninth grade "conforming behavior" has a zero value. For females, "divergent thinking" is a cognitive attribute of those who achieve the highest scores. The patterns confirm Haggard"s explanation (1957, pp. 399-400) that excellence in reading speed and comprehension are related to intellectual activity and the ability to relate symbols with their more tangible referents. If the negative weight for "personal stability" among boys and the low values for conforming behavior were interpreted as withdrawal and viewing persons from a distance, Haggard's findings about the personality of good readers would be supported (pp. 395-396).

For CAT Language, aptitude with symbols seems to be the prime characteristics of those who achieve the highest scores. This concurs with Haggard's interpretation of attention to specific details but, otherwise, the patterns differ from those he presents (pp. 396, 399) unless one uses the modal weights for total population. In our analyses, males who excel differ markedly from females in several respects so we do not believe the combined values should be accepted. For example, by grade nine, the successful boys are rule-bound but the girls are capable of global rather than channeled thinking.

In CAT Arithmetic, aptitude with symbols and channeled thinking both have substantial weights. This checks with Haggard's finding that ability to deal with symbolic relationships and controlled intellectual manipulations make for achievement at a high level in arithmetic (p. 400). The substantial weights for acceptance by age-mates, however, contradicts his interpretation that "high achievers" are relatively independent of peers (p. 397). By grade nine, the boys are more stable than in the preceding year but those who achieve high scores on the advanced test no longer think divergently like the girls continue to do.

Performances in grade IX on STEP Mathematics present something more like the pattern Haggard found for proficiency in arithmetic. Boys exhibit the active, controlled intellectual manipulations of "convergent thinking" and the girls the ability to deal with symbols which he reports (p. 400). Boys also have the high degree of personal stability which he sees as characteristic of the "high general" and the "high arithmetic achievers" (p. 401). The STEP and CAT regressions on the HMF factor variables are somewhat similar for girls but not for the boys. Could this mean that stable boys who can channel their thinking master the STEP test of comprehension and another kind of boy attains success on the CAT instrument? Do girls use the same set of abilities and attributes to approach both tests? Such may be the case with regard to the two measures of performance in the same subject area.

The subject areas evaluated by STEP Social Studies and Science has no parallel in the laboratory school study. STEP Social Studies apparently requires "convergent thinking," somewhat more on the part of the girls than boys. The qualities which make up "age-mate acceptance" are weighted heavily for males and "divergent thinking" for the females in the HMF population. Apparently, by the ninth grade, boys who no longer conform and accept authority can do well on the advanced form.

STEP Science presents a problem in interpretation because the forms employed in grade VIII and grade IX have been shown to be not quite comparable. Both the intermediate and advanced instruments seem to call for ability to channel thinking to one unique conclusion and some degree of acceptance of authority or conformity. Otherwise, the individuals who did well on the eighth-grde form are unlike those who succeeded on the ninth-grade one. This is shown by the reversals for both boys and girls and gives a partial explanation of the low stability and resemblance coefficients obtained in reliability studies (Table D-1, Appendix D). One additional inference can be drawn from the pattern of weights; namely, those who succeed on the ninth-grade science tests are relatively independent of their peers.

To summarize, three cognitive measures, two personality factors, and two indices of appraisals by age-mates emerge as factor variables in the study of potentially-gifted students in junior high schools. In spite of restricted ranges of values for criterion measures and the component indicators, these seven factor variables explain a significant and substantial amount of the variation in grade point averages and in scores on achievement tests. The cognitive abilities, personality attributes, and peer appraisals do not have the same patterns of weights from one criterion measure to another. Therefore, one would infer that somewhat different combinations of characteristics are necessary for success in various subject-matter areas, even for highly-intelligent students. Moreover, the patterns of weights on the HMF factor variables for the same measure of talented behavior are not the same for boys and for girls. True there are some similarities, but one has to accept the conclusion that there are some important sex-typed differences between potentially-gifted boys and girls and that these differences have sone influences upon the manner in which they approach and cope with various kinds of valued performances

A Frame of Reference for Further Research

What has been the major outcome of this complex undertaking that has involved the reduction of a large amount of data to meaningful terms by means of several kinds of multivariate analyses made possible by the use of modern high-speed computing equipment? Have we really learned something about the indicators of variables which combine more effectively to explain and forecast talented behavior among students in junior high schools? Do various kinds of valued performances require not only different abilities but also different elements of personality and kinds of pressures from other persons, both older people and age-mates? Are there ascertainable differences between the sexes in the ways which the factors combine to explain a particular form of desirable behavior? To what extent do the school and community, together with the socialization pressures of peers and parents of different backgrounds, influence the kinds of behavior we have been studying? In what ways do the highly-intelligent boys and girls in public junior high schools differ from the general population therein and with one another in regard to talent? The preceding sections have supplied some answers to all but the first question. Now we have to face up to it.

By and large, we believe that the major outcome of this research is a workable frame of reference and set of techniques for studying and testing ideas about talented behavior in school and, eventually, experimental settings. To conserve space and communicate graphically as well as in symbolic terms, the framework has been represented in a schematic diagram in figure 1. All else being equal, talented behavior is brought about by a combination of innate and acquired abilities, augmented or suppressed by elements of personality and attitudes toward the world of people and things, and facilitated or modified by the expectations and the pressures imposed by peers and older persons. In the report, this state of affairs is represented by modal patterns for total populations in Tables 1 and 2. But two other influences are at work. One is the difference between the two sex roles, the expectations and pressures associated with them which have a moderating influence upon the ways in which abilities and motivations come to life. This also has been shown to be true in Tables 1 and 2 and in the analyses for the total junior high school and the highly-intelligent populations. The other influence is more complicated since it involves the context or settings in which the behavior occurs as well as antecedent opportunities to acquire abilities, shape personality,and experience outside pressures. In the report, this has been illustrated by demonstrating variability from one community to another, by considering the effects of different school programs, and by paying attention to the influences of family and agemates. Thus the schematic diagram and accompanying symbolic representation of a model represent two ways of conceptualizing what has been reported and the kinds of variables to be considered in further research.

In terms of techniques for studying and testing ideas about talented behavior, the major outcome has been the development of what we have termed "factor variables." Both sets, the one for the general population with modifying variables for the two sexes, and the HMF set found among the highly-intelligent students, fit the frame of reference

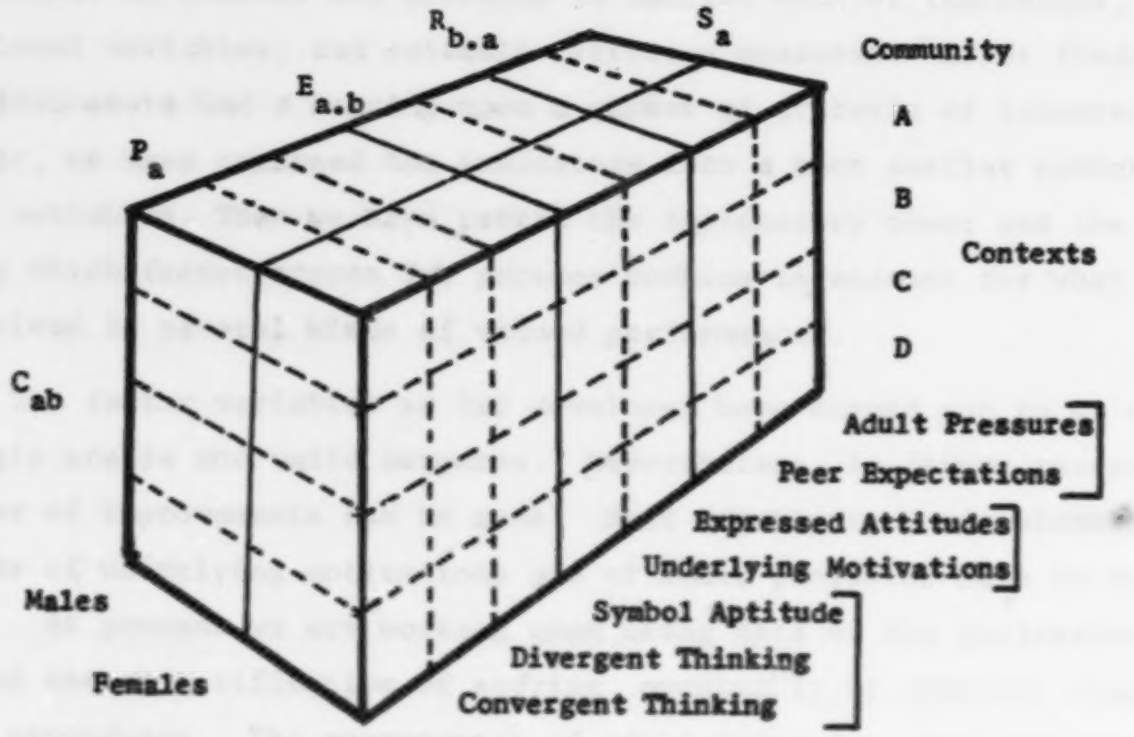
$R_{b.a}$
S_a
Community
$E_{a.b}$
P_a
A
B
Contexts
C
D
C_{ab}
Adult Pressures
Peer Expectations
Expressed Attitudes
Underlying Motivations
Males
Symbol Aptitude
Divergent Thinking
Females
Convergent Thinking

Fig. 1. Schematic diagram of a model for research in human talent.

$$B_a = f\,(P_a,\ E_{a.b},\ R_{b.a}),\ S_a,\ C_{ab}$$

B_a = **behavior of the person (a) to be explained or predicted;**

P_a = **potential cognitive, perceptual, and other relevant abilities;**

$E_{a.b}$ = **elements of personality and motivation, especially expectations about one's own behavior and probable responses of other persons;**

$R_{b.a}$ = **responses of other persons (b) expressed in terms of their expectations and pressures they impose upon the a given individual (a).**

S_a = **sex-role identification of the individual (a) and sex-typing of socialization pressures, both moderating preceding variables;**

$C_{a\,b}$ = **context of behavior, such as a community or school setting which provides an institutional framework along with certain experiences and impersonal expectations; or, the setting in which a natural or a laboratory experiment takes place.**

and support the general proposition with which the research began. To move toward factor variables which had explanatory value, we have used variance, factor-analytic,and multiple-regression methods to reduce a large number of indices and measures to smaller sets of indicators, or dimensional variables, and suitable criterion measures. After finding which indicators had a bearing upon a number of criteria of talented behavior, we have combined the indicators into a much smaller number of factor variables. Then we have tested the explanatory power and the ways in which factor scores for persons combine to account for what is involved in several kinds of valued performances.

The factor variables so far developed have turned out to be surprisingly stable and valid measures. Nevertheless, in future research, a number of improvements can be made. Most important, some suitable measures of underlying motivations and of adult pressures have to be found. At present we are working upon using data of the projective type and the objectification of scoring, eventually by computer translation procedures. The measurement of adult pressures, and comparisons with what a boy or girl anticipates both depend upon finding means of gathering data from older persons without them feeling that their privacy is being invaded. When the analyses of data obtained in grade nine are complete, we expect to find that DAT Mechanical Reasoning may be replaced by DAT Abstract Reasoning in the factor variable, "cognitive approach," for the general population and the HMF factor, "convergent thinking," for the potentially-able students. Similar improvements in composite sets of a small number of reliable and valid indicators, probably not more than three, are the ideal we have in mind for future work with this or any other population.

Perhaps our greatest concern is with the criterion measures. They do not quite represent what we would regard as criteria of talented behavior. True they are the measures commonly used to evaluate different kinds of performances in school settings. But, as Michael suggests (1957), there should be some careful exploration of criterion development. One idea we have in mind is to use the same multivariate methods employed in the development of factor variables to isolate and define the most efficient criteria for different kinds of talented behavior.

When both the sets of predictors for various situations and kinds of persons and suitable criteria of talented behavior finally have been identified, prediction studies can be carried out and the cross-validation and establishment of validity generalization of results becomes important. Meanwhile, this phase I of the Human Talent Project has served to provide a frame of reference and some techniques for further research.

Suggestions for Improving the Educative Process

At this point we are somewhat hesitant about making specific suggestions for the improvement of the educative process. More definte inferences can be drawn from the studies of grouping and the natural experiments forming phase II of the Human Talent Project. Nevertheless, there are some questions to be considered and suggestions which follow from this phase of the project.

From the results obtained in the series of analyses, we are very much concerned as to whether or not people in schools are encouraging the more divergent, less goal-bound kinds of thinking necessary for creativity and many kinds of talented behavior. By and large, boys seem to be penalized more than girls for divergent thinking if the analyses summarized in Tables 1 and 2 have any meaning. True, most objective tests search for the "one right answer," but the teacher evaluations of boys seem to place no value whatever on the ability to think in different directions, sometimes searching for a solution and sometimes seeking variety (Guilford, 1959). On the other hand, girls do appear to receive some credit for such cognitive abilities.

The second matter which arouses our concern is the frequency with which the syndromes of "practical-minded toughness" in the general junior high school population and "antisocial attitude" among the highly-intelligent serve to depress different kinds of valued performances. The core indicator in each factor variable is a tough-minded outlook which is accompanied by an inability to deal with symbolic material in the first instance and a kind of alienation symdrome (Davids, 1955, 1956) among the potentially-gifted students. There seems to be a relationship between psychological health, cognitive functioning, and various kinds of valued performances (Jackson Getzels, & Xydis, 1960) which is not being given the attention it deserves. Our comparisions of "self-contained"and "departmentalized" types of instruction in the seventh grades suggests that the latter kind of school organization makes for greater remoteness of the teachers. No particular individual seems to assume responsibility for a boy or girl in trouble unless he or she can and is willing to go to a counselor. Here we are only pointing up a problem and not suggesting a solution.

On the positive side, this research points to the eventual development of a battery of factor variables to assess the present status and to forecast future performances of secondary school and, eventually, college students. Each factor score would require a very minimum number of tests, or what we have called indicators. Since many of the present tests now are relatively short and essential parts of some present batteries might be incorporated, the total time for administration would not be much more than what is required in the current testing programs of many school systems. Our hope, of course, is that the resultant factor scores would have the kinds of meaning such that results would be used diagnostically and necessary learning experiences or counseling be provided. In other words, we have a great deal of faith in the proposition that any prediction can be upset if school people do something out of the ordinary in guiding learning experiences or providing necessary counseling for young people with shortcomings in particular abilities, elements of personality, or interpersonal relations. This, of course, is the phase of the Human Talent Project complementary to the one reported here.

Table 1

Estimated Modal Weights of Factor Variables for Criterion Measures During Junior High School Years

(Rounded to two places, decimal points omitted)

Factor Variable	Criterion Measures							
	GPA Teacher	CAT Reading	CAT Language	CAT Arithmetic	STEP Soc. St.	STEP Science	Nom Talented	Nom (named)
Males								(Athletic)
A. Cognitive Approach	37	67	57	49	64	63	03	-07
B. Divergent Thinking	..	02	..	(-08)(05)†	05	(..)(09)†	08	-02
C. S-O Achvt. Motivation	15	15	13	06	07	(14)(..)†	06	-05
D. Peer Stimulus Value	37	10	11	17	06	(06)(..)†	61	77
E. Abs. Neg. Valuations	19	..	02	14	05	05	-02	06
F. Anxious Emotionality	..	(..)(08)†	..	(..)(-08)†	..	04	05	..
G. Antisocial Wariness	..	06	15	(19)(-05)†	03	..	..	..
Range: Gr. VII, VIII, R	.66	.69	.62	.60	.73	.70	.66	.73
Grades IX, R		.79	.70	.68	.69	.64		
Females								(Rhetoric)
A. Cognitive Approach	41	65	54	53	66	68	13	15
B. Divergent Thinking	13	09	09	05	06	03	-03	..
C. S-O Achvt. Motivation	09	08	(..)(09)†	11	(-03)(11)†	01	..	..
D. Peer Stimulus Value	27	(11)(..)†	15	12	06	05	63	64
E. Abs. Neg. Valuations	17	09	12	18	07	05	-10	09
H. Sensitive Dependency	03	..	..	..	-04	-03	07	07
I. Perceptual Defenses	-08	-05	-05	-04	-06	(-10)(..)†	-03	-04
Range: Gr. VII, VIII, R	.68 .73	.75	.63	.63	.77	.74	.69	.71
Grade IX, R		.78	.72	.69	.71	.65		
Total Population								(IPS)
A. Cognitive Approach	38	67	52	53	53	65	09	-08
B. Divergent Thinking	07	05	08	(-03)(06)†	06	02	..	-06
C. S-O Achvt. Motivation	12	11	(..)(18)†	07	(..)(12)†	(07)(-03)†	05	08
D. Peer Stimulus Value	29	07	11	15	06	(06)(-06)†	62	48
E. Abs. Neg. Valuations	19	05	07	15	05	05	-06	23
J. Prac-Mind. Toughness	-13‡	-14‡	-35‡	-17‡	-12‡	(-08)(..)‡	-02	
K. Anx-Depnt. Resentment	-06‡	-04‡	-07‡	...	-05‡	...	03	
Range: Gr. VII, VIII, R	.69 .71	.73	.73	.62	.74	.71	.66	.50
Grade IX, R		.77	.68	.70	.69	.66		

†Loading weights for the factor variable changed from grades VII and VIII, first (), to grade IX, second (), indicating a shift in the contribution the factor scores made toward prediction of the criterion variable.

‡Loading weights for factor variables H and I were obtained for the total population only in grades VII and VIII. Regressions of criteria on these factor scores were not computed for grade IX, nor for IPS Peer Status.

Table 2

Estimated Modal Weights of HMF Factor Variables for Criterion Measures During Junior High School Years for a Population of Highly-Intelligent Students from Four Communities*

(Rounded to two places, decimal points omitted)

HMF Factor Variables	Criterion Measures						
	GPA Teacher	CAT Reading	CAT Language	CAT Arithmetic	STEP Soc. St.	STEP Science	STEP Math
Males							
1. Personal Stability	-09	-13	(-13)(..)†	(-12)(02)†	-09	(17)(-14)†	23
2. Divergent Thinking	06	-03	(..)(-12)†	(21)(-03)†	10	(-03)(13)†	06
3. Convergent Thinking	12	35	21	15	23	36	47
4. Symbol Aptitude	..	25	47	29	06	(-09)(21)†	13
5. Conforming Behavior	26	(14)(..)†	(15)(..)†	15	(09)(-14)†	12	07
6. Age-Mate Acceptance	66	20	13	29	26	06	12
7. Antisocial Attitude	-09	-22	-15	-19	-19	-21	-03
Multiple R, Grade VIII	.67	.56	.61	.63	.62	.53	
Grade IX		.66	.69	.62	.60	.60	.60
Females							
1. Personal Stability	14	05	13	11	08	06	11
2. Divergent Thinking	15	17	(-06)(14)†	16	19	(24)(..)	16
3. Convergent Thinking	07	35	..	27	42	39	25
4. Symbol Aptitude	39	27	57	28	11	26	34
5. Conforming Behavior	09	09	-13	20	10	14	..
6. Age-Mate Acceptance	27	13	13	15	05	(-13)(..)†	09
7. Antisocial Attitude	-22	-09	-23	-16	-08	..	..
Multiple R, Grade VIII	.66	.60	.66	.66	.61	.58	
Grade IX		.69	.70	.65	.56	.61	.60
Total Population							
1. Personal Stability	..	-04	(-11)(03)†	-03	...	(11)(-03)†	17
2. Divergent Thinking	12	10	..	11	16	(20)(..)†	10
3. Convergent Thinking	06	37	18	21	40	44	45
4. Symbol Aptitude	24	27	49	34	12	13	19
5. Conforming Behavior	17	..	..	11	06	(-03)(12)†	06
6. Age-Mate Acceptance	38	15	13	20	14	04	08
7. Antisocial Attitude	-20	-16	-23	-20	-14	-07	05
Multiple R, Grade VII	.60	.57	.58	.58	.50	.60	
Grade VIII	.62	.56	.62	.65	.61	.49	
Grade IX		.64	.68	.61	.56	.62	.60

*Table 1 was derived from Tables I-8, I-9, and I-10 in Appendix I. GPA Teacner Evaluations were available only for grades VII and VIII. STEP Mathematics was substituted in Grade IX. Regressions on criterion measures were computed separately for boys and girls only for grades VIII and IX, 53 males and 49 females. The original population of HMF students in grade VII was 213, of whom 120 were males and 93 females.

†Loading weights for the factor variable changed from grade VII or VIII, first (), to grade IX, second (), indicating a shift in the contribution of the factor score toward the prediction of the criterion measure.

Abstract

TALENTED BEHAVIOR IN JUNIOR HIGH SCHOOLS

A talent is a pre-eminent aptitude or a superior ability, either natural or acquired, or a capacity for achievement or success. In school settings, "human talent" refers not only to various kinds of scholastic aptitude and academic achievement, measured by objective instruments and evaluated by teachers, but also to other forms of behavior appraised by one's age-mates and older people. Thus talented behavior involves both personally-significant and socially-valued competencies, including signs of creativity, recognized as such through performances or products which can be assessed by other persons.

The basic assumption underlying this research is that, if factors such as innate ability be held constant, talented behavior is acquired and becomes organized, or structured, and to some extent predictable as a consequence of the educative process. Unless something out of the ordinary is done in guiding learning experiences, a process we term "telesis," the behavior of most individuals attains a kind of crude stability or invariance which makes it predictable. What is needed most today is a thoroughgoing re-examination of learning experiences provided in schools to remove blocks which impede the development of talented behavior. The alternative is limited educational attainment by potentially-able students and a continuation of socially-unacceptable forms of behavior among adolescents, both of which tend to reduce the pool of talent in schools and, later, in adult populations.

Nature of Talented Behavior

What kinds of indicators or variables combine most effectively to explain and forecast talented behavior among boys and girls in the junior high school years? Do various kinds of valued performances require not only different abilities but also different elements of personality and kinds of pressures from other persons, both older people and age-mates? Are there ascertainable differences between the sexes in the ways in which the factors combine to explain a particular form of desirable behavior? To what extent do the school and community, together with the socialization pressures of peers and parents of different backgrounds, influence the types of behavior being studied? In what ways do the highly-intelligent boys and girls in public junior high schools differ from the general population therein and with one another in regard to talent? The answers to these and related questions were sought in the Human Talent Project begun in 1957 with all boys and girls entering the seventh grades in schools of four medium-sized Texas communities, some 1,500 being in attendance each day. The project was designed to last three years until those who remained in the same school location had completed the ninth grade in the spring of 1960.

Underlying the questions to be answered in phase I of the project was a general proposition about the nature of talented behavior which, in effect, provided a research model. Talented behavior, as defined at the beginning of this abstract, was expected to be a function of:

(a) pertinent cognitive, perceptual, and psychomotor abilities;
(b) elements of personality and motivation, especially expectations about one's behavior and probable responses of others to it;
(c) ways in which boys and girls are valued and have pressures imposed upon them by others such as parents, age-mates, and teachers.

The research group anticipated that the three classes of variables might combine in different ways as a consequence of the sex-typing of socialization pressures and the different patterns of educational experiences and expectations in the four school locations.

The research had three important, rather obliquely related, action objectives. One was to demonstrate, not only to the academic world but also to laymen, the feasibility of a university and public schools pooling their efforts in gathering data and testing ideas. The second was to assist school personnel in acquiring not only fact-finding and fact-interpreting skills but also to encourage plans for the modification and enrichment of their work with junior high school students by the development of a pattern of work conferences, consultation, and exchange of information. The third action objective was to interest and provide valuable learning experiences in educational research for an increasing number of faculty members and graduate students.

Gathering and Processing the Data

Frankly speaking, the research team faced a monumental task of gathering, organizing, processing, and making sense of a wealth of data in three years, from the early fall of 1957 to the late spring of 1960. Decisions as to what instruments were to be administered were made by a committee in the spring and summer of 1957. A number of tests were revised for use with adolescents and other devices were prepared. The administration of instruments was carried out largely by members of the project staff and faculty associates with valuable cooperation from the people in the four school systems.

By means of several kinds of multivariate analysis in pilot studies, variables judged to be most pertinent to the study of talented behavior were identified. We used IBM cards and, later, tapes to organize and store data. Programs were written for such basic processes as transforming the original values punched on cards after scoring into another deck of cards with stanine values. The reduction of raw data to stanine values facilitated variance, factor-analytic, and multiple-regression analyses using IBM 650 equipment.

Then the most stimulating and productive steps in the processing of the data began. By means of a series of factor-analytic studies, we were able to map out the different ways in which variables combined to sort out and portray achievements, abilities, and attributes. We also sorted out the meanings of 46 kinds of descriptions age-mates made of one another in response to the nomination items devised earlier. The analyses indicated that five sociometric factors were common to boys and girls and, consequently, we could use a smaller number of factor scores to represent appraisals by peers.

Two complementary techniques, multiple regression and factor analysis, were employed to identify the significant indicators of talented behavior and to reduce them to an even smaller number of meaningful factor variables. Multiple correlation coefficients ranging from R = .75 to R = .86 were obtained to represent the strength of the relationships between criterion measures, such as teacher evaluations and standard tests, to various combinations of the 32 indicator variables. Measures of the strength of association were not quite so high when data were combined across communities for boys and girls, but the analyses almost invariably explained 50 per cent or more of the variation in the different kinds of valued performances (R = .71 or greater).

The results encouraged us to take the next step, that of reducing the 32 promising indicators to a smaller number of factor variables which could more effectively explain, yet still predict with some precision and confidence, different kinds of talented behavior. This was done both for the total population and for a population of highly-intelligent students whose CTMM IQs ranged from 113 to 140. In the general population, we sorted out five factors common to boys and girls, two specific to each sex, and two characterizing deviant behavior. Among the potentially-able students, seven factors were identified but not quite the same ones as for all boys and girls. Then the multiple-regression method was used to determine the optimal weights for the component indicators of each factor variable. New sets of factor scores were computed for each person who had completed instruments administered in the seventh grade.

The explanatory and predictive values of the factor variables were explored by determining their relative weights for and strength of association with two kinds of criterion measures, academic achievements and age-mate appraisals. Combinations of weights attached to the factor scores were different for teacher evaluations, the several kinds of objective tests, and the various appraisals. In grade seven, the sets of factor scores were not as strongly related to the criteria of talent as were the separate sets of indicators. Instead of shrinking, the multiple correlations by the ninth grade either remained similar to or increased significantly over previous years (R = .68 to R = .79). From these and other tests of significance, we concluded that the factor variables were reasonably stable and valid measures which served to explain a large proportion of the variance in several kinds of talented behavior, both academic and non-academic.

Results and Interpretations

The factor variables developed for the general junior high school population fall into three categories. Five were common to both sexes and explained a good deal of the variance in the different criterion measures; namely, "cognitive approach," "divergent thinking," "socially-oriented achievement motivation," "peer stimulus value," and "absence of negative valuations." Two each were specific to each sex and often served to modify the quality performance on measures of talented behavior; namely, "anxious emotionality" and "antisocial wariness" for boys, and "sensitive dependency" and "perceptual defenses" for girls. The remaining two variables were not linked to either sex role and invariably acted as suppressors to explain less effective behavior; namely, "practical-minded toughness" and "anxious-dependent resentment."

The ways in which the foregoing factor variables combine vary according to the criterion of talented behavior. In most instances the patterns differ for boys and girls. Two tend to have high relative loadings, "cognitive approach" for standard tests of achievement and "peer stimulus value" for age-mate appraisals. Both are strongly represented in teacher evaluation. The other variables serve to augment, modify, or suppress the ones with major weights.

The factor variables found among 213 students, 120 boys and 93 girls, in the study of highly-intelligent junior high school pupils are not the same as for the general population. Three are cognitive in nature; namely, "convergent thinking," "divergent thinking," and "symbol aptitude." Two represent positive and negative elements of the makeup of personality and expressed attitudes, "personal stability" and "antisocial attitude." The remaining pair combine peer evaluations and characteristics of the individual, "age-mate acceptance" and "conforming behavior."

The seven HMF factor variables serve to explain a significant and substantial among of the variation in teacher evaluations and in scores achieved on a number of standard tests by the highly-intelligent students. Cognitive abilities, personality attributes, and peer appraisals do not have the same patterns of weights from one criterion to another.

Therefore, one would infer that somewhat different combinations of characteristics are necessary for success in the various subject-matter areas, even for potentially-able students. Moreover, the patterns of weights on the factor variables for the same measure of talented behavior are not necessarily the same for boys and for girls. True there are some similarities, but one has to accept the conclusion that there are some important sex-typed differences between potentially-gifted males and females and that these differences have some influence upon the manner in which persons of each sex approach and cope with various kinds of valued performances.

Conclusion

By ~~and large, we believe that~~ the major outcome of this research is a workable frame of reference and set of techniques for studying and testing ideas about talented behavior in school and, eventually, experimental settings. All else being equal, talented behavior is brought about by a combination of innate and acquired abilities, augmented or suppressed by elements of personality and attitudes toward the world of people and things, and facilitated or modified by the expectations and the pressures imposed by peers and older persons. But two other influences are at work. One is the expectations and pressures associated with sex roles and the other involves the context or setting in which learning has taken place and behavior occurs. Details in the report verify the moderating influences of sex-typed differences and the effects of different school programs. In terms of techniques for studying and testing ideas about talented behavior, the most valuable contribution is the development of what we have termed "factor variables" which turn out to be surprisingly stable and valid measures. Nevertheless, in future research a number of improvements can be made both in the factor variables and in the criterion measures of talented behavior.

APPENDIX A

JUNIOR HIGH SCHOOL POPULATION

Table A-1

School Attendance in Grade VII

Community	School	Attendance		Classrooms		
		ADM	ADA	HR	AM	Type
A	Junior High School	387.26	365.70	12	32	SC
	Junior High (Negro)	37.67	36.40	2	19	SC
	Grade VII	424.93	402.10	14		
B	Elementary I-VII			5	27	SC
	Elementary I-VII			2	27	SC
	Elementary I-VII			1	27	SC
	Elementary I-VII	270.36	254.51	2	27	SC
	Junior High (Negro)	92.45	81.13	3	31	Dp
	Grade VII	362.81	335.64	13		
C	Junior High School			11	35	Dp
	Junior High School	518.88	483.02	4	35	Dp
	Junior High (Negro)	30.37	27.20	2	15	Dp
	Grade VII	549.25	510.22	17		
D	Junior High School			7	28	Dp
	Junior High School			1	28	Dp
	Elementary I-VII			1	28	SC
	Elementary I-VIII	281.80	262.49	1	28	SC
	Total	1618.79	1510.45	54		

Note: ADM = Average Daily Membership
ADA = Average Daily Attendance
HR = Number of Home Room Sections
AM = Average Membership of Home Room Section
SC = Self-contained classrooms Dp = Departmentalized instruction

Table A-2

Distribution of Grade VII Population by Selected Attributes*

Attributes		Community				Total
		A	B	C	D	
		Grade VII Boys				
Ethnic Group	Anglo-American	182	134	226	120	662
	Latin-American	5	1	85	35	126
	Negro-American	17	47	26	6	96
Family Status	Upper-Class	7	2	1	0	10
	Upper-Middle	22	14	27	5	61
	Lower-Middle	68	30	63	22	183
	Upper-Lower	48	55	93	68	264
	Lower-Lower	20	38	45	26	129
	Unknown	39	43	108	40	230
Intelligence (CTMM)	IQ 122-140	18	8	20	3	49
	IQ 113-121	15	10	38	15	78
	IQ 103-112	37	33	70	26	166
	IQ 94-102	49	36	59	27	171
	IQ 84-93	34	36	57	38	165
	IQ 75-83	21	19	26	22	88
	IQ 58-74	6	9	12	9	36
	Unknown	24	31	55	21	131
Boys	Total	204	182	337	161	884

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*Boys and girls who responded to one or more instruments of the battery of data-gathering devices in 1957-58. The "unknown" classification represents individuals who did not supply Biographical and Information Data (BID) or did not respond to the California Test of Mental Maturity (CTMM) during the scheduled administration or make-up sessions.

Table A-2 (continued)

Attributes		Community				Total
		A	B	C	D	
Grade VII Girls						
Ethnic Group	Anglo-American	180	120	164	105	569
	Latin-American	1	2	78	25	106
	Negro-American	24	46	33	7	110
Family Status (ISS)	Upper-Class	6	1	0	0	7
	Upper-Middle	23	9	20	7	59
	Lower-Middle	67	29	55	14	165
	Upper-Lower	53	56	72	42	221
	Lower-Lower	14	40	41	40	135
	Unknown	42	33	87	36	198
Intelligence (CTMM)	IQ 122-140	11	6	15	3	35
	IQ 113-121	20	10	26	8	64
	IQ 103-112	55	38	53	20	164
	IQ 94-102	37	28	37	27	129
	IQ 84-93	32	24	69	30	155
	IQ 75-83	21	22	32	19	94
	IQ 58-74	7	12	4	3	26
	Unknown	22	28	39	27	116
Girls	Total	205	168	275	137	785

Table A-2 (continued)

Attributes		Community				Total
		A	B	C	D	
Total Population						
Ethnic Group	Anglo-American	362	254	390	225	1231
	Latin-American	6	3	163	60	232
	Negro-American	41	93	59	13	206
Family Status (ISS)	Upper-Class	13	3	1	0	17
	Upper-Middle	45	23	47	12	127
	Lower-Middle	135	59	118	36	348
	Upper-Lower	101	111	165	108	485
	Lower-Lower	34	78	86	66	264
	Unknown	81	76	195	76	428
Intelligence	IQ 122-140	29	13	35	6	84
	IQ 113-121	35	20	64	23	142
	IQ 103-112	92	71	123	46	332
	IQ 94-102	86	64	96	54	300
	IQ 84-93	66	60	126	68	320
	IQ 75-83	42	41	58	41	182
	IQ 58-74	13	21	16	12	62
	Unknown	46	59	94	48	247
Population	Total	409	350	612	298	1669

Table A-3

Students in Grade VII Population Attending School in Grade IX*

Attributes		Community A	Community B	Community C	Community D	Total
	Grade IX Boys					
Ethnic Group	Anglo-American	133	89	130	77	429
	Latin-American	1	1	39	15	56
	Negro-American	15	19	6	3	43
Family Status (ISS)	Upper-Class	7	2	0	0	9
	Upper-Middle	20	13	19	3	55
	Lower-Middle	52	23	34	18	127
	Upper-Lower	38	38	59	43	178
	Lower-Lower	16	20	25	17	78
	Unknown+	16	13	38	14	81
Intelligence (CTMM)	IQ 122-140	15	7	11	3	36
	IQ 113-121	10	8	28	5	51
	IQ 103-112	32	29	40	21	122
	IQ 94-102	37	30	42	21	130
	IQ 84-93	23	17	24	24	88
	IQ 75-83	17	8	9	10	44
	IQ 58-74	4	2	5	6	17
	Unknown+	11	8	16	5	40
Boys	Remaining in Location	149	109	175	95	528
	Transfer or Drop Out	55	73	162	86	356

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*Boys and girls who responded to one or more instruments of the battery of data-gathering devices in both 1957-58 and in 1959-60.

+Students classified in the "Unknown" category in 1957-58 and who now are classified appropriately in the research population.

Table A-3 (continued)

Attributes		Community				Total
		A	B	C	D	
	Grade IX Girls					
Ethnic Group	Anglo-American	130	87	104	61	382
	Latin-American	1	1	41	16	59
	Negro-American	19	25	8	4	56
Family Status (ISS)	Upper-Class	5	1	0	0	6
	Upper-Middle	16	9	15	7	47
	Lower-Middle	53	24	35	8	120
	Upper-Lower	46	41	53	19	159
	Lower-Lower	9	26	25	33	93
	Unknown[+]	21	12	25	14	72
Intelligence	IQ 122-140	9	4	8	3	24
	IQ 113-121	16	8	20	0	44
	IQ 103-112	46	34	39	20	139
	IQ 94-102	25	19	17	19	80
	IQ 84-93	23	18	38	18	97
	IQ 75-83	15	12	11	9	47
	Unknown[+]	4	5	3	2	14
Girls	Remaining in Location	150	113	153	81	497
	Transfer or Drop Out	55	55	122	56	288

[+] Students classified in the "Unknown" category in 1957-58 and who are now classified appropriately in the research population.

Table A-3 (continued)

Attributes		Community				Total
		A	B	C	D	
Total Population from Grade VII to IX						
Ethnic Group	Anglo-American	263	176	234	138	811
	Latin-American	2	2	80	31	115
	Negro-American	34	45	14	7	100
Family Status (ISS)	Upper-Class	12	3	0	0	15
	Upper-Middle	36	22	34	10	102
	Lower-Middle	105	47	69	26	247
	Upper-Lower	84	79	112	62	337
	Lower-Lower	25	46	50	50	171
	Unknown[+]	37	26	63	28	154
Intelligence	IQ 122-140	24	11	19	6	60
	IQ 113-121	26	16	48	5	95
	IQ 103-112	78	63	79	41	261
	IQ 94-102	62	49	59	40	210
	IQ 84-93	46	35	62	42	185
	IQ 75-83	32	20	20	19	91
	IQ 58-74	8	7	8	8	31
	Unknown[+]	23	22	33	15	93
Total	Remaining in Location	299	223	328	176	1026
	Transfer or Drop Out	110	127	284	122	643
Per Cent	Remaining in Location	73.2	63.8	53.6	59.1	61.5
	Transfer or Drop Out	26.8	36.2	46.4	40.9	38.5

[+] Students classified in the "Unknown" category in 1957-58 and who are now classified appropriately in the research population.

Table A-4

Distribution of Grade IX Population by Sex, Intelligence, and Community

Sex Role	CTMM Advanced Intelligence	Sta-nine	Community A	B	C	D	Total
Boys	IQ 122-140	8-9	12	2	7	7	23
	113-121	7	15	11	23	13	62
	103-112	6	30	29	44	30	133
	94-102	5	40	29	58	28	155
	84-93	4	37	37	57	19	150
	75-83	3	12	13	42	8	75
	58-74	1-2	8	4	17	2	31
	Unknown		58	30	46	25	159
	Sub-total		212	155	294	132	793
Girls	IQ 122-140	8-9	8	3	4	8	23
	113-121	7	20	9	20	10	59
	103-112	6	38	33	48	23	142
	94-102	5	26	26	44	19	115
	84-93	4	27	40	50	16	133
	75-83	3	14	22	38	10	84
	58-74	1-2	2	8	14	0	24
	Unknown		56	16	39	10	121
	Sub-total		191	157	257	96	701
Total	IQ 122-140	8-9	20	5	11	15	51
	113-121	7	35	20	43	23	121
	103-112	6	68	62	92	53	275
	94-102	5	66	55	102	47	270
	84-93	4	64	77	107	35	283
	75-83	3	26	35	80	18	159
	58-74	1-2	10	12	31	2	55
	Unknown		114	46	85	35	280
	Total		403	312	551	228	1494

APPENDIX B

ADMINISTRATION OF INSTRUMENTS

1. California Test of Mental Maturity (CTMM); E. T. Sullivan, W. W. Clark, E. W. Tiegs; California Test Bureau, 1957. Subtests to measure spatial relationships, logical reasoning, numerical reasoning, verbal concepts. Junior high level, form S, administered in grade VII; secondary level, form S, in grade IX.

2. California Achievement Tests (CAT); E. W. Tiegs and W. W. Clark; California Test Bureau, 1957. Battery yields grade placement for reading (vocabulary, comprehension), arithmetic (reasoning, fundamentals), and language (mechanics of English, spelling). Junior high level, form X, administered in grade VII; form W, in grade VIII; advanced, form Y, in grade IX.

3. Sequential Tests of Educational Progress (STEP); various authors; Cooperative Test Division, Educational Testing Service, 1957. Separate tests of listening, science, social studies, reading (r = .90 with CAT reading), mathematics (r = .73 with CAT arithmetic), and writing (r = .71 with CAT language). Form 3A, listening, science, social studies, administered in grade VII; form 3B, same, in grade VIII; form 2A, same plus mathematics, in grade IX.

4. Differential Aptitude Tests (DAT); G. K. Bennett, H. G. Seashore, A. G. Wesman; Psychological Corporation, 1947. Form A, mechanical reasoning, clerical speed and accuracy, administered in grade VII; abstract reasoning, space relations, in grade VIII.

5. Guilford's Factor Tests (GFT); J. P. Guilford and associates; Reports from the Psychological Laboratory, No. 4, University of Southern California, 1951. Gestalt transformation, common situations, consequences, seeing problems, unusual uses, rhymes, thing categories, vocabulary completion. All eight tests administered in grade VII; split-halves of first five, pretest and posttest, in grade IX.

6. Kit of Reference Tests (KRT); J. W. French (Ed.); Manual for Kit of Selected Tests for Reference Aptitude and Achievement Factors, Educational Testing Service, 1954. Mutilated words, short words, Gestalt completion, copying, writing "lack". All five tests administered in grade VII; split-

halves for first two, pretest and posttest, in grade IX.

7. Psychomotor Test II (PMT); Air Training Command Publication Bm122 Azx; used by special permission of the Air Research and Development Command, U.S.A.F., Lackland Air Force Base, Texas. Tests of discrimination reaction time (DRT), dotting, writing X's, administered in grade VII.

8. Junior Personality Quiz (JPQ); R. B. Cattell and associates; Institute for Personality and Ability Testing, 1952 (now the High School Personality Questionnaire). Scales for emotional sensitivity vs. toughness; socialized morale vs. dislike of education; independent dominance; surgency vs. desurgency; nervous tension vs. autonomic relaxation; neurotic, fearful emotionality vs. stability or ego strength; will control vs. relaxed casualness; impatient dominance; cyclothymia vs. schizothymia; adventurous cyclothymia vs. withdrawn schizothymia; energetic conformity vs. quiet eccentricity; intelligence. All twelve scales administered in grade VII; first four scales, pretest and posttest, in grade IX.

9. Survey of Study Habits and Attitudes (SSHA); W.F. Brown and W. H. Holtzman; Psychological Corporation, 1953. Items keyed for scholastic motivation, study habits, achievement drive, self confidence, procrastination orientation, educational philosophy, teacher valuation; modified for use in secondary schools (copies available from Laboratory of Human Behavior, University of Texas, Austin, Texas). Modified SSHA administered in grade VII; community B in grade VIII; scale for scholastic motivation, split-halves for pretest and posttest, in grade IX.

10. Casteneda-McCandless Anxiety Scale (CMAS); A. Casteneda and B. R. McCandless; State University of Iowa, 1956. The children's form of the Taylor Manifest Anxiety Scale; vocabulary and items modified for use with adolescents (copies available from Laboratory of Human Behavior, University of Texas, Austin, Texas). Modified CMAS administered in grade VII; community B in grade VIII; split-halves, pretest and posttest, in grade IX.

11. Texas Cooperative Youth Study (CYS); Bernice M. Moore, W. H. Holtzman, and associates; Hogg Foundation for Mental Health, University of Texas, 1955. Part 1, scales for authoritarian discipline, criticism of youth,

orientation to society, criticism of education, family problems, self inadequacy; part II, scales for personal adjustment, social inadequacy, resentment of family life style, family tension, social isolation, resentment of dependency; vocabulary modified for use with junior high school students (copies available from Laboratory of Human Behavior, University of Texas, Austin, Texas). Modified CYS battery administered in grade VII; community B in grade VIII; split-halves of first three scales of part I and two of part II, pretest and posttest, in grade IX.

12. Need-Need Anxiety Scales (NNAS); I. L Child and associates; Department of Psychology, Yale University. Scales to measure needs and anxiety regarding aggression, achievement, autonomy, dominance, nurturance, and isolation; vocabulary and items modified for use with adolescents (copies available from Laboratory of Human Behavior, University of Texas, Austin, Texas). Modified NNAS administered in grade VIII; scales for aggression and achievement, pretest and posttest, in grade IX.

13. Personality Q Representations (PQR); C. McGuire and associates; Laboratory of Human Behavior, University of Texas, 1957. Self descriptions of "The Person I Am" and "The Person I Would Like to Be" by placements of Q items representing both dimensions of behavior (self concept, role behaviors, interpersonal relations, behavioral controls) and psychological orientations (intensional, dependent, extensional, ambivalent). Experimental PQR forms for self and ideal self administered in grade VII; community B, in grade VIII and grade IX.

14. Sentence Completion Survey (SCS); R. F. Peck and associates, Laboratory of Human Behavior, University of Texas, 1960. Responses to 41 incomplete sentences; pretest and posttest, administered in grade IX.

15. Thematic Apperception Technique (TAT); H. A. Murrary; Harvard University Press, 1943. Slides for cards 1, 2, 3BM, 6BM, 6GF, 8BM of Murrary TAT and pictures A-3 and A-5 from the Mental Health in Education Project, University of Texas. Group administration, community B, in grade IX.

16. Ink-Blot Test (IBT); W. H. Holtzman; Manual for the Ink-Blot Test, University of Texas Press, 1959. Experimental form administered individually to a sample of 198 subjects drawn to represent community, sex role, level of mental function, and family status, in grade VII.

APPENDIX C

STIMULUS-ITEMS FOR NOMINATION INSTRUMENTS

Sociometric Nominations

Age-Mate Acceptance

The following pair of stimulus items was used to elicit sociometric valuations of one another at each school location. Then the positive and negative valuations were employed to construct sociometric matrices representing clique structures and degrees of acceptance, avoidance, rejection, and isolation among peers as well as to compute an index of peer status (IPS) for each boy and girl in grade VII, VIII, and IX. These and other stimulus-items shown below, as well as procedures for constructing sociographs and computing IPS values, have been described by Clark & McGuire (1952), McGuire & Clark (1952), McGuire, White, & Murphy (1960), and Hindsman (1960).

PVR. - Write below the names of three persons you would prefer to run around with most of the time. What grade is each one in?

NVR. - Write below the names of three persons you might not prefer to be with most of the time. What grade is each one in?

Role Assignments

Wheels. - Name three persons about your age who sort of "make the wheels go 'round." They are boys and girls who tend to run things wherever they are. "They're tops."

*Brains. - Name three persons about your age who are sort of "brains." They are boys or girls who get their ideas from books. They tend to do what older people want.

Average Ones. - Name three persons about your age who are sort of "average ones." Outside of school, they run around quite a bit but they're not wild.

*Quiet Ones. - Name three persons about your age who are sort of quiet. They're often forgotten or just not noticed.

Wild Ones. - Name three persons about your age who are short of "wild ones." They are boys and girls who could get into trouble.

*Left Out.- Name three persons about your age who are "left out" of things on purpose. They make other people feel uncomfortable.

Model Value

Personal Model. - (+) Name three persons with whom you would talk over a very personal matter. (-) Name three persons with whom you would not prefer to discuss personal matters.

Behavior Model. - (+) Name three persons you would like to be like. (-) Name three persons you would not like to be like.

*Academic Model. - (+) Name three persons you could work with, or ask for help, on a school problem. (-) Name three persons you would not ask for help if you had to work on a problem. (Work With; Not Ask for Help)

Behavioral Approach

Active. - Name three persons about your own age who are active in making things come out the way they want them to be. They know what they want and do something about it. (Know Want)

Passive. - Name three persons about your own age who tend to wait and let things happen to them. They are boys or girls who avoid trouble when difficulties arise. (Avoid Trouble)

Behavioral Control

Impulsive. - Name three persons about your age who do many things without thinking. They "don't care" but sometimes they are sorry.

Affectively Neutral. - Name three persons about your own age who think what might happen before they do anything so they won't feel ashamed of what they have done.

Relational Orientation

*Adult-Oriented. - Name three persons about your own age who always depend upon their parents or older people for advice. They look up to older persons for approval.

Peer-Oriented. - Name three persons about your own age who always depend upon kids about their own age for advice. They want to be liked, so they do what the others want.

Independent. - Name three persons about your own age who are sort of independent in making up their minds. They may take advice from their friends and older people and parents, but they decide about things for themselves.

Creativity vs. Fantasy

*Imaginative. - Name three people about your own age who have good imaginations. They have new ideas and new ways of doing things.

Daydreamer. - Name three people about your own age who daydream a great deal. The things they dream and think about often do not make sense.

Manifest Talents

Actor. - Name three people about your own age who are or who could be good actors.

Artistic. - Name three people about your age who have outstanding artistic ability. They are people who can draw, paint, or design clothes, or make beautiful things.

Athletic. - Name three people about your own age who are really good at athletics and sports.

*Math Ability. - Name three people about your age who are really good in arithmetic.

Mechanical. - Name three persons about your own age, whom you may or may not know very well, who have outstanding mechanical ability. They are people who have real understanding of tools and machines. They build and repair things and really know how things work.

Musical. - Name three persons about your own age, whom you may or may not know very well, who have outstanding musical talent. They are people who sing, play an instrument, or dance very well.

Science. - Name three people about your age who are really good in science.

*Verbal. - Name three persons about your own age, whom you may or may not know very well, who have a lot of ability in dealing with words. These are people who are outstanding speakers or writers.

*Hidden Talent. - Name three persons about your own age, whom you may or may not know very well, who have some hidden ability or who have shown a great deal of talent. They should be encouraged and given opportunities to learn in and out of school.

Peer Affiliation

*Party With. - Name three persons about your age you would prefer to have along if you were going to a game or party this weekend. They are the ones to be with.

*Not Party. - Name three persons about your age you might not prefer to have along. They could go other places. They have their own friends and you have yours.

Perceived Attributes

*Gets By. - Name three persons who never seem to enjoy anything much. They do enough to get by, but resent doing anything "extra."

*Enjoys Everything. - Name three persons who seem to enjoy everything they do. They welcome the chance to do new things.

Desires Approval. - Name three persons who seem to need approval for everything they do.

*Self Confident. - Name three persons who know when they have done things well and have confidence in what they have done. They don't need to be encouraged by other people before they feel self confident.

*Shows Initiative. - Name three persons who see things to do and go ahead and do them on their own initiative. (Do Things on Own)

*Lacks Initiative. - Name three persons who have to be told everything to do and how to do it. They seldom seem to be able to do anything on their own. (Has to be Told)

Educational Attitude

Likes School. - Name three persons who enjoy their school work and do it with real personal satisfaction.

*Dislikes School. - Name three persons who find school work a disagreeable chore. They resent any kind of drill or study.

Fear of Failure. - Name three persons who work hard in school because they are afraid of failing or of being criticised if they do not come up to a certain standard. (Work Because Has To)

Character Profile (1958)

Amoral. - Name three persons who do whatever they feel like doing a lot of the time. They don't seem to care what they do to other people, or what other people think. (Do What Feel Like)

Expedient. - Name three persons who are strictly out for themselves, but they keep an eye on what others think of them. They stick to the rules as long as it gets them what they want. (Out for Self)

Conforming. - Name three persons who get along with whatever crowd they are in. They don't do much independent thinking but they can be counted on to do what is expected. (Go Along Crowd)

Irrational Conscientious. - Name three persons who have their own set of moral principles and conform to them rigidly--everything is either "right" or "wrong." For example, they may always be "honest" no matter what effect it may have on others. (Conform Moral Principles)

Rational Altruistic. - Name three persons who genuinely care about the way their behavior affects other people and they try to think ahead of time so that they will treat others fairly. They have solid moral principles of their own and they try to live up to them. (Consider Effect of Behavior)

Manifest Achievement Drive (1959)

Values Learning. - Name three persons about your own age who like to learn a lot just to know it. These persons don't much care if what they learn has any practical value; the important things are to learn and know.

Avoids Failure. - Name three persons about your own age who really do everything they can to avoid doing poorly in school work. They put lots of effort into everything they have to do and they keep working and trying at things until they are successful or realize they can't be done.

Works Effectively. - Name three persons about your own age who try to do all kinds of difficult things quickly and well.

Seeks Recognition. - Name three persons about your own age who like to be known for their excellent achievement in school work. These persons seem to get real satisfaction from knowing they are strong students.

Overcomes Difficulties. - Name three persons about your own age who don't let difficulties stop them when they want to get something done. If they meet with difficulties, they try even harder to gain success.

Achieves Results. - Name three persons about your own age who seem to work like a slave at everything until they are satisfied with the results.

Enjoys Work. - Name three persons about your own age who enjoy work as much as they do play.

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*Stimulus-items administered in grade IX, along with the seven items to assess manifest achievement drive, in order to obtain factor scores for nomination variables.

Self Reports

Perceived Roles

Each boy and girl was asked to check the following role descriptions for "where I fit in," "where my best friends fit in,"and "where I would like to fit in."

( ) The ones who really get around; the "wheels," "the top crowd."
( ) The students; the "brains," or "good kids," but don't get around much.
( ) The "average Ones' not in the top crowd, who get around out of school.
( ) The "quiet ones;" seldom noticed, but they have one or more friends.
( ) The "wild ones;" other kids are sort of afraid of being with them.

Ego Function

Each boy and girl was asked to check one of the following descriptions of ego function for "myself" and for "most people."

( ) This person acts without thinking ahead very much. Sometimes he is ashamed of what he does and at other times he doesn't really care.

( ) This person just doesn't do anything for fear he might act the wrong way. He sort of freezes up because he is afraid of what might happen.

( ) This person does what his parents and teachers have taught him to do. Then he doesn't do the wrong thing and feel unhappy about it later.

( ) This person has an idea of the person he'd like to be like, so he won't do anything that this person would not do.

( ) This person makes up his own mind about things. He listens to others but he decides for himself.

Teacher Nominations

To identify potentially talented boys and girls for natural experiments involving various kinds of educational telesis, especially the counseling study in community B, the following stimulus-items were used to elicit nominations from teachers.

(a) These are pupils of good ability who do good work only if they feel like it. Usually their work is mediocre or poor. They don't seem to care.

(b) These are pupils of good ability who occasionally do good work, and could do much better if they were not troubled by personal problems. They seem disorganized, confused, unable to concentrate, and inconsistent in their efforts.

(c) These pupils seem to have good ability but rarely do good work. They seem to resent almost all school demands and requirements. It may even appear that they try to do poorly.

(d) These are pupils of good ability whose school work might be better if they had fewer troubles at home.

APPENDIX D

DESCRIPTION OF VARIABLES

The administration of instruments used in the Human Talent Project yielded 140 different measures, including scores on subtests in batteries and index values. By means of various procedures described in the report, variables most pertinent to the study of talented behavior in the junior high school years were identified. In so far as possible, repeated measures involved only the selected variables. To reduce the distributions of values for nominations to manageable proportions, the 46 measures available in the grade VIII year were changed by factor-analytic procedures to factor-variables, five common to both sexes, five specific for boys, and five for girls. All distributions of scores or index values were transformed to stanine values "1" to "9" with "5" as the mean value for the total population so as to permit maximum use of the IBM 650 facilities at the University Computing Center.

Criterion Measures

Academic Achievement

GPA Teacher Evaluation. - Grade point average derived from teacher evaluations of performance in content subjects (English, social studies, mathematics, science, foreign language) for each student during the school year; computations for grades VII, VIII, and IX. (McGuire & others, 1960)

CAT Reading. - Grade placement scores from California Achievement Tests; different forms in grades VII, VIII, and IX; two subtests, vocabulary (mathematics, science, social science, general) and comprehension (following directions, reference skills, interpretations).

CAT Language. - Grade placement scores from California Achievement Tests; different forms in grades VII, VIII, IX; two subtests, mechanics of English (capitalization, punctuation,word usage) and spelling.

CAT Arithmetic.- Grade placement scores from California Achievement Tests; different forms in grades VII, VIII, and IX; two subtests, fundamentals (addition, subtraction, multiplication, division) and reasoning (meanings, symbols, rules, equations, problems).

STEP Social Studies. - Scores based upon responses to Sequential Tests of Educational Progress; different forms in grades VII, VIII, and IX; ability to comprehend and draw conclusions about maps, charts, and other illustrative material as well as from concise expositions about people and human affairs.

STEP Science. - Scores based upon responses to Sequential Tests of Educational Progress; different forms in grades VII, VIII, and IX; ability to comprehend and draw conclusions about realistic problems, unfamiliar experiments, tabular and graphic data of a scientific nature.

STEP Mathematics. - Scores based upon responses to Sequential Tests of Educational Progress; administered to total population in grade IX; ability to comprehend and draw conclusions about the use of symbols, formulae, tables, and graphs, and to solve mathematical problems.

DAT Abstract Reasoning. - Scores based upon responses to Differential Aptitude Test; administered to total population in grade VIII; ability to infer and demonstrate deductions from a series of problem figures.

DAT Space Relations. - Scores based upon responses to Differential Aptitude Test; administered to total population in grade VIII; ability to deal with concrete materials through visualization, to manipulate things mentally, or create a structure in one's own mind from a plan by linking graphic patterns and figures.

Age-Mate Appraisals

IPS Peer Status. - Index values computed in grades VII, VIII, and IX from sociographically-weighted positive and negative valuations of members of the age-mate society by peers at each school location after a matrix analysis of the sociometric nominations. (McGuire & Clark, 1952; McGuire, White, & Murphy, 1960)

Nom Artistic. - Transformed distribution of values based upon frequency of nominations in grades VII and VIII of persons "who have outstanding artistic ability" by age-mates in the school location.

Nom Athletic. - Transformed distribution of values based upon frequency of nominations in grades VII and VIII of persons "who are really good in athletics and sports" by age-mates in the school location.

Nom Creative. - Transformed distribution of values based upon frequency of nominations in grades VII, VIII, and IX of persons "who have good imaginations" and who "have new ideas and new ways of doing things" by age-mates in the school location. (Reid, King, & Wickwire, 1959)

Nom Mechanical. - Transformed distribution of values based upon frequency of nominations in grades VII and VIII of persona "who have outstanding mechanical ability," "who have real understanding of tools and machines," and who "build and repair things and really know how things work" by age-mates in the school location.

Nom Musical. - Transformed distribution of values based upon frequency of nominations in grades VII and VII of persons "who have outstanding musical talent" by age-mates in the school location.

Nom Rhetorical. - Transformed distribution of values based upon frequency of nominations in grades VII, VIII, and IX of persons "who have a lot of ability in dealing with words" and "who are outstanding speakers or writers" by age-mates in the school location.

Nom Talented. - Transformed distribution of values based upon frequency of nominations in grades VII, VIII, and IX of persons "who have some hidden ability" or "who have shown a great deal of talent" by age-mates in the school location.

Nom n Ach. - Transformed distribution of values based upon combined frequency of nominations in grade IX of persons who value learning, avoid failure, work effectively, seek recognition, overcome difficulties, enjoy work, and achieve results, by age-mates in the school location.

Dimensional Variables

Potential Abilities

CTMM Mental Function. - Intelligence (IQ) measured by the California Test of Mental Maturity; different forms in grades VII and IX; ability to respond appropriately to language and non-language stimuli having to do with spatial relationships, logical reasoning, numerical reasoning, and verbal concepts.

STEP Listening. - Scores based upon responses to Sequential Tests of Educational Progress; different forms in grades VII, VIII, and IX; comprehension of passages and questions read aloud; postulated to be a measure of cognitive apprehension, efficiency in attending to and concentrating upon verbal stimuli during the learning process. (Adelson & Redmon, 1958)

DAT Mechanical Reasoning. - Scores derived from responses to Differential Aptitude Test in grade VII; pictorially presented mechanical situations with simply worded questions; postulated to be a measure of an aspect of general reasoning, ability to formulate complex conceptions of many kinds from figural materials, as well as visualization and mechanical experience. (Guilford, Kettner, & Christensen, 1956)

Gestalt Transformation. - Scores derived from GFT responses in grades VII and IX; indicate which of five objects has a part which could be used incarrying out a stated operation; postulated to be a measure of an aspect of conceptual redefinition, ability to shift the function of a part of an object and use it in a new way. (Guilford, 1956, 1957, 1959; Hertzka and others, 1954; Wilson, 1958)

Rhymes. - Scores derived from GFT responses in grade VII; write words that rhyme with given words; presumed to be a measure of an aspect of word fluency or verbal facility, listing words satisfying a specified requirement. (Guilford & others, 1951; Guilford, 1959)

Unusual Uses. - Scores derived from GFT responses in grades VII and IX; list different uses for common objects; postulated to be a measure of an aspect of spontaneous flexibility, ability to shift from one class idea to another,and an element of originality. (Barron, 1955; Frick and others, 1959; Guilford, 1959; Wilson, 1958; Wilson, Guilford, & Christensen, 1953)

Consequences. - Scores derived from GFT responses in grades VII and IX; list different consequences or possible results of changes in human or natural situations; postulated to be a measure of an aspect of conceptual foresight, ability to go beyond what is given and extrapolate outcomes, and to be an element of originality. (Barron, 1955; Frick and others, 1959; Guilford, 1959; Wilson, Guilford, & Christensen, 1953)

Common Situations. - Scores derived from GFT responses in grades VII and IX; list problems suggested by everyday situations; postulated to be a measure of an aspect of ideational fluency, ability to call up as many ideas or responses as possible in a given time. (Frick and others, 1959; Guilford, 1959; Wilson, 1958; Wilson and others, 1954)

Seeing Problems. - Scores derived from GFT reponses in grades VII and IX; list problems that might arise in connection with the structure, use, or operation of common objects; postulated to be a measure of an aspect of sensitivity to problems, awareness that problems exist. (Guilford, 1957; Wilson, 1958; Wilson and others, 1954)

Mutilated Words. - Scores derived from KRT responses in grades VII and IX; identify words composed of partial letters; postulated to be a measure of an aspect of symbolic closure, or recognition of symbols. (Guilford, 1957; Wilson and others, 1954)

Gestalt Completion. - Scores derived from KRT responses in grade VII; identify objects with parts missing; postulated to be a measure of an aspect of perceptual closure, or visual figural recognition. (Guilford, 1957; Wilson and others, 1954)

Short Words. - Scores derived from KRT responses in grades VII and IX; encircle groups of four consecutive letters, embedded in rows of letters, that spell out a common English word; postulated to measure speed of perceptual closure, or ability to cognize symbolic units. (Guilford, 1959)

Dotting. - Scores derived from PMT responses in grade VII; place three pencil dots in each of a series of small circles, timed; postulated to measure psychomotor speed. (Fleishman, 1954)

DRT. - Scores derived from PMT responses in grade VII; place a check mark in an appropriate space according to the position of a white circle in relation to a black circle in a preceding square, timed; postulated to measure discrimination reaction time. (Fleishman, 1954)

DAT Clerical Accuracy. - Scores derived from responses to Differential Aptitude Test in grade VII; quickness and accuracy of making comparisons between two lists of letter and number combinations.

Personality Attributes

JPQ 1: Emotional Sensitivity vs. Toughness. - Scale values derived from JPQ responses in grades VII and IX; twelve items such as "If you read something sad in a story, do you (a) find it hard to keep the tears away, or (b) say, 'Oh! It's only a silly story'?"; similar to tender versus tough-minded factor among adults. (Cattell & Beloff, 1953; Cattell & Gruen, 1954)

JPQ 3: Neurotic, Fearful Emotionality vs. Stability or Ego Strength. - Scale values derived from JPQ responses in grade VII; twelve items such as "When people play a joke on you, do you usually enjoy it too, without feeling at all upset?"; combines two factors recognized among adults as main elements in neuroticism compared with self confidence and ego strength.

JPQ 6: Cyclothymia vs. Schizothymia. - Scale values derived from JPQ responses in grade VII; twelve items such as "Do you think that people understand and like you?"; sociable, easy-going, warm-hearted contrasted with dislike of groups, some rigidity, and seriousness.

JPQ 8: Socialized Morale vs. Dislike of Education. - Scale values derived from JPQ responses in grades VII and IX; twelve items such as "When you have to write an essay about your thoughts on some subject do you (a) sometimes enjoy it, or (b) generally dislike having to do it?"; acceptance of school and cultural standards contrasted with dislike of learning and negative reaction to authority.

JPQ 9: Independent Dominance. - Scale values derived from JPQ responses in grades VII and IX; twelve items such as "Do you sometimes think there are too many rules and regulations, and that you should be more free to say what you want to do?"; subjects with high scores represent themselves as being dominant, competitive, unrestrained, with some difficulty in communication.

JPQ 10: Energetic Conformity vs. Quiet Eccentricity. - Scale values derived from JPQ responses in grade VII; twelve items such as "Do you find it hard to talk to the captain of a team or some important boy or girl in school?"; the lively, conforming mixer and the retiring, thoughtful person.

JPQ 11: Surgency vs. Desurgency. - Scale values derived from JPQ responses in grades VII and IX; twelve items such as "Would you rather spend an evening (a) with the hobby you like most, or (b) at a gay party?"; talkative, excitable, gay, and likes variety, in contrast to being serious, quiet, and interested in detailed exact undertakings.

Motives and Attitudes

SSHA Scholastic Motivation. - Scale values derived from SSHA responses in grades VII and IX; 55 items such as "Whether I like a subject or not, I still work hard to make a good grade" and "Unless I really like a subject, I believe in only doing enough to get a passing grade"; odd-even reliability .95, with Spearman-Brown correction, in grade VII; postulated to be a measure of academic attitude or motivational orientation towards scholastic achievement. (Brown, 1956; Brown, McGuire, & Holtzman, 1955; Holtzman, Brown,& Farquhar, 1954; McBee & Duke, 1960)

CMAS Anxiety. - Scale values derived from CMAS responses in grades VII and IX; 41 items such as "I have trouble making up my mind," "I worry about what my parents will say to me," "My hands feel sweaty," "I worry about what other people think of me," and "It is hard for me to keep my mind on school work"; odd-even reliability .90, with Spearman-Brown correction, in grade VII; postulated to be a measure of underlying anxiety, or "the motive to avoid failure," especially in ego-involving, threatening, or stressful situations. (Atkinson, 1957; Casteneda, McCandless, & Palermo, 1956; Phillips, King, & McGuire, 1959; Phillips, Hindsman, & Jennings, 1960)

CYS Authoritarian Discipline. - Scale values derived from CYS responses in grades VII and IX; nine items such as "Strict discipline develops a fine strong character" and "A person my age should take the school subjects which his parents decide would be best for him"; average item-test reliability .77 in grade VII; postulated to be a measure of a set to accept authoritarian beliefs and the control of authority figures. (Frenkel-Brunswik, 1951; Moore & Holtzman, 1958)

CYS Criticism of Education. - Scale values derived from CYS responses in grade VII; ten items such as "Most teachers are too rigid and narrow-minded" and "It is almost impossible for the average student to do all of his assigned homework"; average item-test reliability .86 in grade VII; postulated to be a measure of a set to be negative toward teachers and critical of what is expected in the school. (Moore & Holtzman, 1958)

CYS Criticism of Youth. - Scale values derived from CYS responses in grades VII and IX; six items such as "Silliness is one of the worst faults of most teen-agers" and "Teen-agers gossip too much about each other"; average item-test reliability .67 in grade VII; postulated to be a measure of a set to find fault with one's age-mates and criticize their behavior, reflecting pressures toward social conformity manifested by a concern for good appearances. (Moore & Holtzman, 1958; Phelps & Horrocks, 1958)

CYS Negative Orientation to Society. - Scale values derived from CYS responses in grades VII and IX; eight items such as "When you get right down to it no one is going to care much what is going to happen to you," "A person should insist on his own rights no matter what the cost," and "If you don't watch yourself, people will take advantage of you"; average item-test reliability .78 in grade VII; postulated to be a measure of an aspect of the alienation syndrome which is marked by distrust, egocentrism, pessimism, resentment, and anxiety. (Davids, 1955, 1956; Moore & Holtzman, 1958)

CYS Personal Maladjustment. - Scale values derived from CYS responses in grades VII and IX; 21 items such as "Sometimes I feel things are not real," "I get mad and do things I shouldn't do when I can't have my way," "I feel tired all the time," and "Sometimes criticism gets me down"; average item-test reliability .90 in grade VII; postulated to be a measure of ineffective or borderline in contrast to the effective behavior of a mentally healthy individual--misperception of self and the object world, inability to cope with pressures imposed by others,lack of a sense of identity. (Jahoda, 1958; McGuire, 1956; Moore & Holtzman, 1958)

CYS Social Inadequacy. - Scale values derived from CYS responses in grades VII and IX; twelve items such as "I have trouble making friends easily," "I'm afraid people will laugh at me because I'm not sure how to act," and "I don't feel sure how to act on dates"; average item-test reliability .93 in grade VII; postulated to measure an aspect of interpersonal competence in terms of a lack of ability to interpret the intentions of others and an inability to form person-to-person relationships. (Foote & Cottrell, 1955; Moore & Holtzman, 1958)

NNAS 1: Socially-Modified Achievement Motivation.- Self report variable with a factor score (Fruchter, 1954, pp. 204-205) based upon responses in grade VIIIto NNAS scales for achievement and nurturance; n Ach, .69, ten items such as "I set very high goals for myself which I try to reach"; n Nur, .62, ten items such as "I like to help my friends solve their problems; factor loadings indicate that the variable combines striving for excellence with a desire to be with and help other persons. (Child, Frank, & Storm, 1956; Galliani, 1960; Storm, Rosenwald, & Child, 1958)

NNAS 2: Power Motivation. - Self report variable with a factor score based upon responses in grade VIII to NNAS scales for aggression and dominance; n Dom, .68, ten items such as "I enjoy the power of telling other kids what to do"; N Agg, .63, ten items such as "I like lively discussions with people whose opinions differ from mine, because it gives me a chance to tell them just what I think of their ideas"; factor loadings indicate that the variable combines the desire to direct the behavior of other persons with a willingness to coerce or injure them when threatened or frustrated. (Child, Frank, & Storm, 1956; Galliani, 1960; Veroff, 1957)

NNAS 3. Anxiety Motivation. - Self report variable with a factor score based upon responses in grade VIII to NNAS scales for anxiety about autonomy, dominance, achievement, and isolation; anx Aut, .68, ten items such as "I feel very insecure about reaching any important decisions entirely on my own"; anx Dom, .64, ten items such as "I feel ill at ease when I am in a position where I have to tell others what to do"; anx Ach, .61, ten items such as "I lose interest in activities when I have to compete with others"; anx Iso, .60, ten items such as "I feel 'out of sorts' if I have to be by myself any length of time"; factor loadings indicate that the variable represents the avoidance of tension, or arousal of anxiety, by remaining dependent, not taking responsibility, refusal to compete, and seeking the company of other persons. (Cattell & Scheier, 1958)

Cultural Pressures

ISS Family Status. - Index of social status derived from weighted values (McGuire & White, 1955) for occupation, source of income, and education of the status parent as reported on an identification blank and checked with informants in grades VII, VIII, and IX; index values may be converted to estimates of social class of the family in the community; namely, upper class (UC), 12 to 21 , upper-middle (UM) 22 to 36, lower-middle (LM) 37 to 51, upper-lower (UL) 52 to 66, lower-lower (LL) 67 to 84; postulated to be an indicator of variations in learning experiences in pressures and reinforcements from members of the family, and in expectations held for the boy or girl by school people. (McGuire, 1953, 1954; McGuire & White, 1957; Warner, Meeker, & Eells, 1949)

CYS Family Tension. - Scale values derived from CYS responses in grade VII; twenty items such as "My parents hever have time to help me," "Everyone in my family seems to be against me," and "My parents often object to the kind of boys and girls I go around with"; average item-test reliability .93 in grade VII; postulated to be a measure of tension aroused by inconsistent socialization pressures and manipulative controls, culminating in resentment and hostility. (McGuire, 1951, 1953; McGuire & White, 1957; Moore & Holtzman, 1958; Peck, 1958)

TEIS School Press. - Discrepancy scores, $D = \sqrt{\Sigma(t-s)^2}$ (Osgood & Suci, 1952), between teacher estimates of the ideal student averaged to obtain a profile for the school location over 33 items (t) and responses to the same items of CYS by boys and girls (s) in grade VII; based upon items of the CYS scales for authoritarian discipline, criticism of education, criticism of youth, and negative oreintation to society; postulated to be an experimental measure of the degree of congruence between the attitudes and expectations of each student and the "institutional press" for patterns of behavior valued by teachers in each community. (McGuire & White, 1957; Pace & Stern, 1958; Stern, Stein, & Bloom, 1956)

(TEIS Teacher Expectations).- Similar discrepancy scores over the 55 items of SSHA scale for scholastic motivation between the teacher profile for the ideal student and the responses of boys and girls at each school location in grade IX; (responses of teachers to SSHA incomplete at the time of this report); postulated to be an experimental measure of the degree of congruence between the academic attitudes of each student and the expectations of teachers in each community. (Pace & Stern, 1958)

Ethnic Group. - Classification as Anglo-American, Latin-American, or Negro-American from data on school records, checked with informants each year; postulated to represent variations in culturally-typed learning experiences, socialization pressures imposed by the community, and expectations held for members of each ethnic group by school people. (McGuire, 1951; Pierce-Jones, Reid, & King, 1959)

Sex Role. - Classification from BID as a boy or girl, male or female; sex-role identification reinforced by variations in sex-typed learning experiences, socialization pressures imposed by the family and community, and expectations held for boys and girls by men and women teachers as well as by age-mates in the adolescent society. (McGuire, 1956; More, 1955; Schoeppe, Haggard, & Havighurst, 1953)

School Location. - Classification according to school attended in the four communities, representing somewhat different cultural milieus and types of school organization. (Hindsman & Duke, 1960)

1. Community A: located in North Central Texas; approximately 31,000 people and 5,200 scholastics; 6-3-3 plan with one large junior high school, segregated twelve-grade Negro school; children from a military base attend the schools; a relatively large parochial school, four-year church-supported college; stable population, agricultural base with established small industries utilizing local labor; approximately 90 per cent Anglo and 10 per cent Negro school population.
2. Community B: located in North Central but closer to East Texas; approximately 24,000 people and 4,600 scholastics; now has 6-3-3 plan with two junior high schools but, during grade VII, pupils were in five elementary schools; segregated Negro junior-senior high school; children from two homes for orphans attend public schools; county and state-supported junior college; stable population, economic base similar to A; approximately 72 per cent Anglo and 28 per cent Negro

school population; like A, about 60 miles from a metropolitan center.

3. Community C: located near the Gulf Coast, about 100 miles from and midway between a metropolis and a large city; approximately 40,000 people and 10,500 scholastics; 6-3-3 plan with two large junior high schools; Negro pupils being integrated, beginning with elementary grades, but research sample in a separate school; twelve-grade parochial school for boys and for girls, junior college; a number of "old line" families, but a changing population with the rapid influx of various types of industries, many being branches of large companies, attracting "out of state" families; school population is approximately 64 per cent Anglo (including families of European ethnic origin), 26 per cent Latin, and 10 per cent Negro pupils.

4. Community D: located on the Gulf Coast about 30 miles from C; about 16,000 people and 4,500 scholastics; schools organized on a county-wide basis, 6-3-3 plan with a junior high school in the city plus an eight-grade elementary and a small junior high in other locations; secondary schools now integrated; an eight-grade parochial school; a changing population and a similar industrial base to C, with fishing added to agricultural products; school population about 75 per cent Anglo (including families of European ethnic origin), 20 per cent Latin, and 5 per cent Negro pupils.

Age-Mate Expectations

Nom 1: Peer Acceptance. - Sociometric variable with factor scores (Fruchter, 1954, pp. 204-205) derived each year from stanine values of nominations received by each boy and girl from age-mates at the school location for stimulus-items (Appendix C) in grades VII, VIII, and IX; defined by factor loadings for "party with" .74, "behavior model" .71 (like to be like), and "academic model" .64 (work with); derivation of factor variable and remaining loadings shown in Appendix F; postulated to be a measure of degree of recognition and acceptance among one's age-mates who expect individuals with high scores to be active, rather independent, controlled, imaginative, talented with words or in other ways, and often assign them to the "wheel" role. (Hindsman, 1960; McGuire, 1956)

Nom 2: Absence of Negative Model Value. - Sociometric variable with a factor score derived each year from the reversed stanine values of nominations in grades VII, VIII, and IX; defined by factor loadings for "negative behavior model" -.77 (not like to be like), "negative academic model" -.69 (not ask for help), and "not party"-.67 (low peer affiliation), with remaining factor loadings shown in Appendix F; postulated to be a measure of the degree to which boys and girls are valued negatively or rejected by their age-mates (low scores) or seldom receive such nominations (high scores); low model value appears to be marked by impulsivity, unacceptable behavior, and daydreaming, as well as assignments to the "wild one" or "left out" roles by one's peers. (Hindsman, 1960; McGuire, White, & Murphy, 1960)

Nom 3: Social Effectiveness. - Sociometric variable with a factor score derived each year from the stanine values of nominations in grades VII, VIII, and IX; defined by factor loadings for "enjoys everything" .79, "self confident" .79, and "shows initiative" .78 (does things on own), with remaining loadings in Appendix F;postulated to be a measure of the degree to which boys and girls are expected to be effectively functioning persons by their peers who also regard such individuals as liking school, rational altruistic, conforming to the rules, doing what is expected, working hard, and sometimes out for themselves but within limits. (Hindsman,1960; McGuire, 1956)

Nom 4: Non-Deviant vs. Deviant Behavior. - Sociometric variable with a factor score derived each year from the reversed stanine values of nominations in grades VII, VIII, and IX; defined by factor loadings for "dislikes school" - .77, "lacks initiative"-.77 (has to be told), and "gets by"-.75, with remaining factor loadings shown in Appendix F; postulated to be a measure of the degree to which boys and girls are expected to be non-deviant (high score) or deviant (low score) in their behavior; their peers also regard deviant individuals as needing approval, yet doing what they feel like a lot of the time. (Hindsman, 1960; McGuire, 1956)

Nom 5: Quiet Dependency. - Sociometric variable with a factor score derived each year from the stanine values of nominations in grades VII, VIII, and IX; defined by factor loadings for "quiet ones" .53, "adult-

oriented" .29, and "left out" .29, with remaining factor loadings shown in Appendix F; postulated to be a measure of the degree to which boys and girls are looked upon as quiet, dependent individuals, often left out of things, neither "wheels" nor "wild ones." (Hindsman, 1960; McGuire, White, & Murphy, 1960)

Nom 6B: Avoided Brains. - Sociometric variable, unique to boys, with a factor score derived from nominations for "party with"-.39, "verbal" .35, and "brains" .31; identifies highly verbal boys who are assigned to the "brain" role, yet lack acceptance from age-mates.

Nom 6G: Academic Competence. - Sociometric variable, unique to girls, with a factor score derived from nominations for "math ability" .58, "brains" .56, and "verbal" .53; identifies girls who are regarded as good students, high in both verbal and numerical abilities, by their age-mates.

The remaining factor variables based upon nominations, four for girls and four for boys, are identified in Appendix F. Tentatively, the factors for boys are: 7B, Artistic Temperament; 8B, Creative Imagination; 9B, Overt Impulsiveness; and 10B, Expedient Operator. The factors unique to girls are: 7G, Personal Autonomy; 8G, Adult Orientation; 9G, Amoral Expedient; and 10G, Impulsive Daydreamer. These factors have been identified in the factor analyses of nominations in grades VII and VIII. With restrictions upon time for administration of instrument, the necessary items have not been included in the nominations for grade IX (marked by an asterisk in Appendix C).

Projective Variables

The projective instruments have been administered, with the exception of the SCS and TAT in the spring of 1960, only to sample populations drawn for specific purposes; namely, validity studies and natural experiments involving different kinds of educational telesis. Specific variables are described where they are employed in particular studies and in the Supplementary Appendices, a separate part of this report. Approaches to the analyses of the Ink-Blot Test (IBT) may be found in a manual by Holtzman

1959), the Sentence Completion Survey (SCS) in a paper by Peck and McGuire (1959), and the Thematic Apperception Technique (TAT) in a book by Henry (1956) and a research memorandum by McGuire, Cobb, & Damarin (1956). Methods and variables for the study of accuracy of perceived roles among adolescents have been reported by McGuire & Hindsman (1960).

Distributions and Reliabilities

Table D-1 was constructed to summarize distribution statistics and reliability coefficients obtained for the test variables over a period of three years in so far as data were available at the time of this report. Each test variable was listed in the approzimate order in which the descriptions of criterion measures and dimensional variables, or "indicators" of talented behavior, were presented in preceding sections. After noting the form in which scores were distributed before transformations to the stanine values, the means and standard deviations of the distributions were entered for each year the tests were administered as described in Appendix B. Finally, estimates of reliability (Cronbach, 1960, 129-142; Guilford, 1954, pp. 373-398; Guilford, 1956, pp. 435-459) were computed and entered for test variables in so far as the data permitted the necessary calculations and time allowed.

The distribution statistics were in several different forms, as indicated in the table, before they were transformed to stanine values from "1" to "9" with "5" as the mean so as to fit into columns of the IBM cards for statistical operations on the IBM 650 equipment (Cronbach, 1960, p. 82). The various forms shown in the table were;

Grade	Grade placement scores on standard tests of achievement such as CAT Reading, Language, and Arithmetic;
Index	Index values such as those for ISS Family Status (range 84 to 12) and IPS Peer Status (range -9.00 to +6.00, transformed $X_t = X + 10$, for range 1.00 to 16.00);
Score	Raw or standard scores, the raw scores being those for factor (GFT) and reference (KRT) tests and the standard scores for published tests such as STEP and DAT batteries;

Scale Scale values based upon scoring keys such as those for the JPQ, SSHA, CMAS, CYS, and similar self reports.

The reliabilities, so far as they have been computed, were in three forms; namely, coefficients of consistency (r_{tt}), coefficients of stability (r_{pp}), and coefficients of resemblance (r_I). In some instances, where there was no second administration of an instrument, published reliabilities were shown in parentheses ( ). Where two forms of a test were administered, or a scale was divided into two parts and given as a pretest and posttest, a dagger ( ) was entered after the coefficient of reliability in the table.

Coefficients of Consistency (r_{tt})

These reliability coefficients were regarded as estimates of the equivalence between two full length tests which could be regarded as similar to two halves of the test, or as measures of the internal consistency of the test. In certain cases, the Spearman-Brown formula

$$r_{tt} = \frac{2r_{ab}}{1 + r_{ab}} \qquad (1)$$

was employed, using the split-half or odd-even item correlations (r_{ab}) obtained in the first administration as in the case of the CYS variables. A more efficient estimate of internal consistency by the split-half method was adopted for later estimates of equivalence (Cronbach, 1960, p. 141)

$$r_{tt} = 2(1 - \frac{s_a^2 + s_b^2)}{s_t^2} \qquad (2)$$

where s_a and s_b were the standard deviations of the half-tests and s_t was the standard deviation of the whole test. In other instances, instruments such as those measuring attitudes were scored with a key and items had approximately the same difficulty. Then the Kuder-Richardson formula 21 was applicable,

$$r_{tt} = \frac{n}{n - 1} \cdot \frac{\bar{x}\,(n - \bar{x})}{s^2} \qquad (3)$$

using the mean ($\bar{x}$), the number of items (n), and the standard deviation (s) for the population to which the instrument was administered.

Coefficients of Stability (r_{pp})

These reliability coefficients were obtained by retests of the same subjects on two different occasions. Three different kinds of correlations between pairs of scores for the same population of subjects were computed: (a) for the same test administered in successive years, or in the fall and spring; (b) for two forms of the same instrument administered as pretest and posttest, or on two separate occasions; and (c) for two parts of a scale, which had shown internal consistency, given as pretest and posttest to one or more sub-populations in the natural experiments reported in Part II of the Human Talent Project.

Coefficients of stability over time, between forms, and from pretest to posttest were estimated by the analysis-of-variance approach to the estimation of reliability whenever possible (Guilford, 1954, pp. 383-384), using Hoyt's basic formula for reliability

$$r_{pp} = \frac{MS_b - MS_w}{MS_b} \qquad (4)$$

where MS_b was the variance among individuals over the administrations (deviations between persons) and MS_w was the variance within individuals from one occasion to another (residual within persons). This type of reliability coefficient, marked with an asterisk (*), was most valuable when the effects of sex role, community, and level of mental function upon performance were removed by sampling accordingly and carrying out analyses of variance.

Coefficients of Resemblance (r_I)

A sample population fo 240 subjects, 120 boys and 120 girls, was drawn from the four communities. Each community was represented by 30 boys and 30 girls equally divided so that 10 persons of each sex were drawn to represent high, average, and low mental function (HMF, AMF, LMF) as measured by the CTMM instrument. This sample population was employed not only to determine the influences of sex role, school location, and quality of mental function upon different kinds of test performancec but also to determine their interactions and changes from one year to another, or from pretest to posttest. The means squares for deviation among persons (SCMP) and residual variation from one year or occasion to another (SCMPY) permitted the computation of intraclass correlation coefficients,

$$r_I = \frac{\text{SCMP} - \text{SCMPY}}{\text{SCMP} + (y - 1)\ \text{SCMPY}}$$

which were coefficients of resemblance in performances from one year (y) to another, or from a pretest to a posttest.

Table D-1

Distribution Statistics and Reliabilities for Variables

Variables	Form	1957-58		1958-59		1959-60		Reliability		
		Mean	S.D.	Mean	S.D.	Mean	S.D.	r_{tt}	r_{pp}	r_I
GPA Teacher Evaluation	Scale	9.2	3.1	9.2	3.2	8.5	3.7		.77	
CAT Reading	Grade	7.0	1.6	8.3	2.8	10.0 ‡	2.1		.83 *	.62
CAT Language	Grade	6.9	1.7	8.0	1.8	10.6 ‡	2.4		.85 *	.65
CAT Arithmetic	Grade	7.3	1.2	8.0	1.5	11.3 ‡	2.8		.84 *	.63
STEP Social Studies	Score	35.4	12.2	38.2	11.6	28.7 ‡	9.5		.70 *	.31
STEP Science	Score	27.3	9.6	29.1	8.9	24.2 ‡	7.6		.45 *	.22
STEP Mathematics	Score			22.7	7.8	19.5 ‡	7.4		.67 *	
DAT Abstract Reasoning	Score			70.3	12.0				(.90)	
DAT Space Relations	Score			30.5	20.0				(.86)	
IPS Peer Status	Index	10.7	2.7	10.7	3.3				.59	(.68)
Nom Artistic	$X_t = \sqrt{X} + \sqrt{X+1}$	2.2	1.7							
Nom Athletic	X_t	2.2	1.8						.87	
Nom Creative	X_t	2.2	1.4						.87	
Nom Mechanical	X_t	1.8	1.5							
Nom Musical	X_t	2.1	1.8							
Nom Rhetorical	X_t	2.1	1.8						.96	
Nom Talented	X_t	2.1	1.4						.85	
CTMM Mental Function	Index	98.0	14.3			103.6	14.4		(.87)	
STEP Listening	Score	45.8	18.4	49.4	14.4	40.0 ‡	11.8		.74 *	
DAT Mechanical Reasoning	Score	19.8	11.7						(.69)	
Gestalt Transformation	Score	6.8	2.8			8.3	3.3		.34	
Rhymes	Score	15.0	7.8							
Unusual Uses	Score	5.3	3.5			5.2 †	2.9		.52 *	
Consequences	Score	27.5	12.0			18.6 †	5.9		.43 *	
Common Situations	Score	29.4	9.6			16.2 †	6.7		.52 *	
Seeing Problems	Score	20.3	9.0			9.5 †	6.5		.12 *	
Mutilated Words	Score	17.7	5.8			16.5 †	4.4		.43 *	
Gestalt Completion	Score	32.9	8.4							
Short Words	Score	13.6	5.2			18.6 †	6.6		.48 *	
Dotting	Score	106.0	25.0							
DRT Reaction Time	Score	36.7	14.2							
DAT Clerical Accuracy	Score	38.7	11.7						(.77)	
JPQ 1: Sensitivity	Scale	6.1	2.1			5.8	2.2		.44 *	
JPQ 3: Emotionality	Scale	4.5	2.1							
JPQ 6: Sociability	Scale	7.3	1.7							
JPQ 8: Socialized Morale	Scale	6.9	2.5			6.7	2.2		.47 *	
JPQ 9: Independent Dominance	Scale	5.4	2.1			5.4	2.0		.39 *	
JPQ 11: Surgency	Scale	6.2	2.1			6.2	2.1		.55 *	
SSHA Scholastic Motivation	Scale	48.9	18.9			22.3 †	8.0	.95		
CMAS Anxiety	Scale	37.9	15.5	36.8	14.6	38.7	14.2	.90		
CYS Authoritarian	Scale	9.2	3.1	8.5	3.1	9.0	2.9	.77	.54 *	
CYS Critic of Education	Scale	14.4	3.8	14.6	4.0			.86		
CYS Critic of Youth	Scale	6.2	2.2	6.0	2.1	6.0	2.2	.64	.44 *	
CYS Neg. Social Orientation	Scale	7.8	2.8	8.0	2.8	7.5	2.7	.78	.58 *	
CYS Personal Maladjustment	Scale	14.9	6.9	13.5	8.7	16.4	5.2	.90	.67 *	
CYS Social Inadequacy	Scale	7.3	4.9	7.3	4.2	7.4	4.3	.93	.56 *	
CYS Family Tension	Scale	10.7	6.5	10.8	7.2	11.5	8.1		.60 *	
ISS Family Status	Index	54.5	14.5							

* Two forms of a test were administered or a scale was divided into two parts and given as pretest and posttest.

† Obtained by averaging split-halves used as pretest and posttest; not comparable to previous year.

‡ Advanced forms of CAT and STEP administered in the spring of 1960.

() Published coefficient of reliability, the lowest value being entered where sex differences were reported.

APPENDIX E

ANALYTIC STUDIES OF THE VARIABLES

A series of analytic studies of the variables described in Appendix D was carried out to determine the probable nature and organization of the attributes of junior high school students. Three purposes are served by this appendix. One is to demonstrate, by means of analyses of variance, the ways in which sex role, level of mental function, school location, and type of family background have a moderating influence upon the performances of boys and girls on cognitive and non-cognitive instruments. The second is to illustrate the type of factor structure and the communalities obtained in a series of factor-analytic studies of the several classes of variables. To conserve space, the intercorrelation matrices and resultant factor structures which map relationships of the variables to one another for different sample populations have been placed in the separate Supplementary Appendixes to this report. The third purpose is to summarize and compare the factorial composition of the variables for the total population and several kinds of sub-populations of junior high school students in the four communities.

Analyses of Variance

The analyses summarized in Table E-1 for cognitive performances and in Table E-2 for behavior on noncognitive instruments demonstrate that the sex-typing of socialization pressures upon a boy or girl, patterns of educational experiences in different school locations, and cultural differences within communities, in addition to intellectual qualities, have moderating influences upon test behavior (McGuire, 1960). For each set of analyses, the subjects were 144 seventh-grade students, 72 boys and 72 girls, drawn by random procedures from the total population. Each of the four communities, designated A, B, C, D, was represented by 36 subjects. Of these boys and girls, equal numbers were selected from high (HFS), average (AFS), and low (LFS) status homes as determined by ISS Family Status. Each subsample was further subdivided according to measured intelligence (HMF, AMF, LMF) in terms of CTMM Mental Function. A total of 44 analyses of variance were carried out, 22 for cognitive test variables and 22 for noncognitive instruments of the paper-and-pencil type.

The analyses of variance were carried out on the IBM 650 computer and F tests were used to identify significant interactions and main effects. Then intraclass correlation coefficients (Ostle, 1954, pp. 194-197) were computed for each significant mean square in the resulting tables, employing the formula

$$r_I = \frac{MS_a - MS_w}{MS_a + (n-1)MS_w}$$

where

MS_a = mean square for "among groups"
MS_w = mean square for "within groups"
n = number of subjects in each group

and using the deviation term (SFMLP) as MS_w for the calculation from each analysis of variance. The intraclass correlation coefficients were regarded as measures of the degree of "resemblance" among subjects in the same sex role (S), family status (F), level of mental function (M), school location (L), or sharing some combination of these attributes. For example, in Table I-E, the coefficient of .49 in the column for mental function (M) and the row for CAT Reading Achievement has replaced a mean square significant at the .01 point in the original analysis of variance. The coefficient, r_I = .49, represents the degree to which 48 subjects in the same category of mental function are alike in performances on the standard test. In general, coefficients of .08 or larger for main effects depart from zero at the .01 level of confidence in terms of F tests of the mean squares they replace, and smaller entries in the two tables are significant at the .05 point.

Factor Analyses

Table E-3 is an illustration of results derived from a factor analysis of 50 selected variables for the total population in the seventh grade. The selections were made after a study of the distribution statistics, the early measures of reliability, the variance analyses, and a number of factor-analytic studies of smaller subsets of variables. As a result of the preceding work, a number of decisions to omit potential variables were made. The omissions were part scores on achievement tests, a number of factor and reference tests, and approximately half of the JPQ and CYS scales. A sample set of nomination items from Appendix C was included in the intercorrelation matrix, using transformed scores $(X_t = \sqrt{X} + \sqrt{X + 1}$, so as to determine relationships among cognitive, noncognitive, and sociometric measures.

The procedures used to obtain the factor structure and communalities shown in Table E-1 for the total population of 1417 students were followed for the factor-analytic studies of seventeen sub-populations shown in the Supplementary Appendixes. Centroid factors were extracted (Fruchter, 1954) pp. 59-85) by means of a program written for use with the IBM 650 computer. Originally, the quartimax method of rotation for centroid factor loadings (Wrigley, Saunders, & Neuhas, 1958) was employed to obtain simple structure Then a decision was made to program for rotation of the factors to the orthogonal normal varimax solution (Kaiser, 1958). The varimax criterion was chosen since it had the likelihood of portraying factors invariant under changing samples of tests and populations studied.

Comparison of Factor Loadings

Table E-4 is derived from the aforementioned factor-analytic studies of the total population and seventeen sub-populations in the seventh grade. Variance analyses had shown that sex role, mental function, school location, and family status all had some degree of influence upon various kinds of test performances. Moreover, there was evidence that varying degrees of age-mate acceptance reflected pressures imposed by one's peers and, more indirectly, by cultural agents such as parents and teachers (McGuire, 1956; McGuire, White, & Murphy, 1960). In addition to factor analyses of the 50-variable matrices for the total population, for boys (M), and for girls (F), the factor structures for the following sub-populations were obtained:

a. Mental Function
    HMF = High, CTMM I.Q. 113 or more (one S.D. above the mean),
    AMF = Average, CTMM I.Q. 84 to 112 (within one S.D. of mean),
    LMF = Low, CTMM I.Q. 83 or less (one S.D. below the mean);
b. School Location
    A = North Central, large junior high, self-contained classrooms,
    B = North Central, elementary I-VII, self-contained classrooms,
    C = Gulf Coast, two large junior highs, departmentalized program,
    D = Gulf Coast, combination of departmentalized and self-contained;

c. Peer Acceptance (based upon PVR and NVR valuations, Appendix C)

Acc = Accepted, three or more PVR's, at least twice NVRs,
Amb = Ambivalent, four or more PVRs and NVRs, approximately equal,
Avo = Avoided, two or three nominations, PRV and NVR represented,
Rej = Rejected, three or more NVRs, at least twice PVRs,
Iso = Isolated, none or only one nomination, PVR or NVR;

d. Family Status

HFS = Iss 12 to 40, upper, upper-middle, and middle-middle class,
AFS = ISS 41 to 68, lower-middle and upper-lower class families,
LFS = ISS 69 to 84, lower-class family backgrounds.

In Table E-4, factors from each of the 18 analyses are matched as closely as possible and given a tentative name. For example, under Total Grade VII, the loadings from Factor I in Table E-3 are shown in descending order of magnitude. Entries with a value of less than .25 have been omitted since they are likely to be unstable and do not add to the interpretation and comparision of factor structures. The remaining columns of the table show comparable loadings from the factor-analytic studies of the 17 sub-populations for the tentative Factor A, Scholastic Achievement. A Roman numeral at the head of each column identifies the factor in the order of extraction in the original table. An asterisk (*) indicates the variable's highest loading in any factor for the total population or sub-population.

Table E-4 not only summarizes the interpretable factor loadings from the 18 original analyses but it also facilitates a number of different kinds of comparisons. For example, one can readily see that Factor A, Scholastic Achievement, is defined by objective measures of achievement in the different subject areas and that, in most sub-populations, aptitude and ability tests are represented. Nevertheless, there is considerable variation from column to column which remains open to interpretation. Similar kinds of comparison may be made by referring to the other tentative factors in the table: namely, B, Academic Grades (which is incorporated with Factor A in community B); C, Divergent Thinking; D, Socially-Oriented Achievement Motivation; E, Ineffectively-Functioning Personality (which is polar to Factor D in community B); F, Social Alienation; G, Perceptual Closure; H, Peer Recognition; I, Deviant Age-Mate Behavior; and J, Active Conformity, which is ill-defined and does not appear in all sub-populations.

Table E-1

Significant Intraclass Correlation Coefficients from Analyses of Variance for Cognitive Performances of 144 Junior High Students

Test Variable		Source of Variation*				
		S	F	M	L	Interaction
	d.f.	1	2	2	3	
CAT Reading Achievement			.08	.49		
Vocabulary			.05	.44	.05	
Comprehension			.08	.38		
CAT Language Achievement		.25		.41	.09	
Mechanics of English		.18	.09	.45	.13	
Spelling		.18		.29		
CAT Arithmetic Achievement				.40	.20	
Fundamentals				.29	.31	SFML .36
Reasoning				.39		
STEP Social Studies				.29		FML .22
STEP Science			.05	.19		FML .29
STEP Listening				.31		FML .24
DAT Clerical Aptitude		.34				SFML .31
DAT Mechanical Reasoning		.19		.11		
Vocabulary Completion		.07		.49	.07	
Gestalt Transformation				.12		FML .31
Mutilated Words				.19		
Gestalt Completion						SML .19
Short Words		.16		.15	.07	
Copying			.10	.14		SML .21
Dotting		.15				ML .11
DRT		.06		.07		

---

*Sex role (S), family status (F), CTMM mental function (M), and school location (L).

Table E-2

Significant Intraclass Correlation Coefficients from Analyses of Variance for Noncognitive Performances of 144 Junior High Students

Test Variable	Source of Variation*				
	S	F	M	L	Interaction
d.f.	1	2	2	3	
JPQ 1 Sensitivity/Toughness	.48				FL .10
2 Tension/Relaxation			.07		SL .18
3 Emotional/Stability					
4 Control/Casualness					
5 Impatient Dominance	.06				
6 Cyclo-/Schizothymia					
7 Adventurous Withdrawn					
8 Socialized Morale	.20				
9 Independent Dominance	.13	.05		.10	
10 Energetic Conformity					
11 Surgency/Desurgency	.24				
CYS Family Tension					SFML .62
Social Orientation		.10			
Authoritarian Discipline			.06		
Personal Adjustment					SFML .40
Criticism of Education					SFM .18
Criticism of Youth					
Social Inadequacy			(FML .32)		SL .23
Self Inadequacy			(FML .30)		SFM .22
CMAS Anxiety			.05		
SSHA Scholastic Motivation					SFML .41
Teacher Valuation	.05				FL .09

*Sex role (S), family status (F), CTMM mental function (M), and school location (L).

Table E-3

Orthogonal Factor Loadings and Communalties of 50 Variables for Total Grade VII Population, N = 1417

(Decimal points omitted)

Variables	Factors†											h²
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	
1. Teacher Social Studies Grades	43	-10	14	14	13	-71	-11	-11	-15	00	-12	81
2. Teacher Mathematics Grades	45	-09	12	17	02	-65	-07	-00	-16	01	-18	75
3. Teacher English Grades	39	-10	20	13	18	-70	00	-05	-05	-10	-21	79
4. GPA Teacher Evaluation	43	-09	16	15	12	-82	-06	-05	-11	00	-17	98
5. JPQ 1: Sensitivity vs. Touhness	-16	17	30	-10	-09	-08	11	-28	-05	-23	-16	34
6. JPQ 3: Emotionality vs. Stability	-21	29	-53	-11	-08	07	11	-18	08	-07	-03	49
7. JPQ 6: Sociable vs. Withdrawn	11	-06	42	05	08	-05	-03	01	-02	01	00	21
8. JPQ 8: Socialized Morale	-06	-06	71	-04	-01	-06	07	-13	-04	08	-13	56
9. JPQ 9: Independent Dominance	09	13	-57	07	02	04	11	-02	04	11	11	39
10. JPQ 10: Energetic Conformity	06	-15	02	19	15	-04	-26	05	-16	-19	-03	22
11. JPQ 11: Surgency vs. Desurgency	-02	06	-19	11	13	-03	-21	-02	-02	-44	-06	31
12. Dotting (psychomotor speed)	21	-01	07	14	19	-09	-09	-10	-15	08	-41	32
13. DRT (discrimination reaction)	32	-03	-01	15	14	-07	-13	-03	-06	15	-30	28
14. SSHA Scholastic Motivation	28	-19	47	07	09	-21	02	-15	-11	14	-01	45
15. CMAS Anxiety	-11	50	-32	-11	-05	09	40	02	-01	-12	03	56
16. CYS Criticism of Education	-19	12	-38	-08	-04	11	09	31	02	-08	-05	35
17. CYS Criticism of Youth	-02	14	-06	05	06	-01	56	00	01	-01	00	34
18. CYS Authoritarian Discipline	-16	06	03	00	-03	05	62	-04	-02	08	06	42
19. CYS Negative Social Orentation	-22	21	-25	01	-07	07	45	34	-02	06	-01	48
20. CYS Personal Maladjustment	-05	79	-14	-01	-01	08	09	01	12	-01	04	68
21. CYS Social Inadequacy	-05	77	-11	-09	-05	01	10	-08	04	00	00	63
22. CYS Family Tension	-18	64	-17	00	-06	08	10	13	07	00	02	51
23. CAT Reading Achievement	84	-03	13	07	01	-16	-03	-01	-01	-11	-19	80
24. DAT Clerical Speed and Accuracy	33	-01	12	07	11	-15	-04	06	13	-04	-44	38
25. DAT Mechanical Reasoning	58	-14	-16	03	08	07	-06	06	-09	29	00	49
26. CAT Language Achievement	70	-05	13	04	01	-24	-01	-03	01	-27	-37	78
27. CAT Arithmetic Achievement	67	-08	11	04	-04	-28	-03	09	-10	-09	-27	65
28. STEP Social Studies	83	-03	09	07	08	-18	-09	-03	-04	00	-09	76
29. STEP Listening	75	-05	08	09	20	-13	-22	-08	-07	05	-07	70
30. STEP Science	80	-02	12	07	08	-15	-08	-04	-08	08	-03	70
31. Short Words (speed of closure)	32	-00	10	05	09	-16	05	05	01	-15	-46	39
32. Gestalt Transformation	56	-05	-05	05	07	-10	-08	-02	-02	17	-03	38
33. Gestalt Completion	37	-04	-02	08	29	02	-12	-03	-10	10	-34	38
34. Mutilated Words (symbolic closure)	33	-03	06	07	19	-19	04	-02	-06	-11	-51	47
35. CTMM Mental Function	72	-10	03	10	09	-10	-02	-05	-02	-05	-13	57
36. ISS Family Status	-42	11	-04	-15	-16	06	08	16	-05	03	07	28
37. Consequences (foresight)	37	-04	08	09	52	-06	03	02	-04	-08	-12	45
38. Common Situations (idea fluency)	21	-07	06	13	60	-10	00	-04	-02	-05	-21	49
39. Unusual Uses (flexibility)	57	-06	01	08	35	-12	-06	02	-04	06	-07	49
40. Rhymes (word facility)	62	-10	05	05	22	-18	03	00	05	-12	-22	55
41. Seeing Problems	41	-06	10	01	53	-14	-06	04	-01	-02	-25	55
42. Nom: Brains	41	-05	14	47	-10	-25	05	-09	-04	06	-12	51
43. Nom: Wheels	14	-03	06	73	03	-11	03	01	01	01	-16	59
44. Nom: Imaginative	23	-06	03	57	04	-21	01	-08	06	08	-11	45
45. Nom: Daydreamer	-05	09	-13	26	01	10	01	-00	55	-02	15	43
46. Nom: Average Ones	05	-02	-02	68	11	-02	-04	04	09	-12	01	50
47. Nom: Quiet Ones	02	05	09	-22	-15	-05	06	-20	17	-01	01	15
48. Nom: Left Out	-05	08	-04	-05	-05	07	03	-03	67	01	05	47
49. Nom: Wild Ones	-11	04	-16	45	07	19	-07	25	41	-02	02	53
50. IPS Peer Status	11	-10	11	30	07	-15	04	-16	-24	-11	-03	25

†Centroid factors with normal varimax solution, rotation to .05 by IBM 650 computer.

Table E- 4

Comparison of Factor Loadings from 50-Variable Matrices for Selected Grade VII Populations

(Decimal points omitted)

(Asterisk denotes highest loading for a variable in a factor matrix)

Variable	Total Grade VII	Sex Role		Mental Function			School Location				Peer Acceptance					Family Status		
		M	F	HIQ	AIQ	LIQ	A	B	C	D	Acc	Amb	Avo	Rej	Iso	HFS	AFS	LFS
N	1417	772	645	199	991	227	338	319	488	264	290	160	338	189	301	195	996	195
Factor A: Scholastic Achievement																		
F	I	I	I	I	I	I	I	I	I	III	I	I	I	I	I	I	I	I
23. CAT Reading	84*	87*	83*	84*	70*	69*	84*	85*	84*	59*	78*	82*	73*	85*	75*	83*	84*	83*
28. STEP Social Studies	83*	84*	83*	70*	80*	63*	82*	85*	85*	66*	83*	83*	78*	81*	79*	78*	82*	78*
30. STEP Science	80*	80*	80*	76*	77*	56*	79*	77*	82*	70*	78*	77*	79*	76*	78*	78*	79*	82*
29. STEP Listening	75*	72*	79*	67*	73*	38*	72*	76*	85*	72*	75*	76*	77*	67*	76*	68*	72*	72*
35. CTMM I. Q.	71*	71*	71*	42*	46*		70*	67*	71*	57*	66*	80*	64*	64*	75*	68*	70*	69*
26. CAT Language	70*	76*	73*	61*	51*	60*	65*	83*	70*	28	61*	73*	55*	77*	61*	78*	67*	67*
27. CAT Arithmetic	67*	70*	65*	59*	48*	52*	64*	75*	71*	29	57*	69*	56*	71*	66*	82*	65*	75*
40. Rhymes	62*	65*	64*	42*	36*	28	47*	73*	69*	43*	55*	67*	59*	65*	60*	61*	48*	57*
25. DAT Mechanical	58*	59*	55*	32	48*	27	54*	52*	60*	62*	48*	61*	67*	58*	57*	51*	54*	60*
39. Unusual Uses	57*	55*	58*		50*	29	48*	62*	58*	55*	46*	51*	61*	50	65*	36	49*	44*
32. Gestalt Transform'n	56*	55*	57*	40*	47*		51*	58*	60*	46*	57*	55*	60*	55*	51*	52*	51*	58*
2. Teacher Math.	45	44	48	37	29		35	76*	47		36	42	40	45	39	73*	35	64*
4. GPA Teacher Eval'n	43	45	46	35	30		31	77*	45		35	40	39	44	37	69*	32	59
1. Teacher Soc. Stud.	43	44	44	26	33		30	73*	41	37	33	31	40	42	41	54*	30	47
36. ISS Family Status	42*	36*	50*		29*	25*	43*	44*	71*	41*	66*	46*	44*	35*	47*		43*	
41. Seeing Problems	41	43	43		28		38	49*	47	34	34	35	37	41	43		39	28
42. Nom: Brains	41	45*	39	51*			44*	55*	32	28	26	32	35	33	49*	53*	44*	53*
3. Teacher English	39	41	43	33	27		25	77*	39		30	36	29	42	28	61*	26	54
33. Gestalt Completion	37*	36	46*		28		40*	44*	38	34	42*	33	45*	46*			40*	
37. Consequences	37	34	38		29			54*	36	39*	29		30	33	37			25
24. DAT Clerical	33	33	45*			40*		58*	28		33			50*	26	37		
34. Mutilated Words	33	36	40				31	68*	28		27	38		45*		37*	32	30
31. Short Words	32	37*	34	31				49*	32			32*		52*	38	40*		34*
13. IRT Reaction Time	32*	30	41*				32	38*	29*		39*	29	33	34*	27*	30*	32	32*
14. SSHA Sch. Motiv'n	28	25	29	28			25	39*	35						26	31	25	34
44. Nom: Imaginative		26		33				35							27	25		28
38. Common Situations			29		52			36		26				25			25	
12. Dotting			38*				26	45*			28*	28				26	26	
19. CYS Neg. Soc. Or'n			-29				-28		-28		-29		-31				-28	
16. CYS Crit. Educat'n									-26									
22. CYS Family Tension												-36						
7. JPQ 6: Sociable												30			68*			
5. JPQ 1: Sensitive										-35*			-28					
43. Nom: Wheels									32									
Factor B: Academic Grades																		
F	VI	VI	IV	VI	VI	III	II	(I)	VII	V	VII	II	V	VI	V	X	II	V
4. GPA Teacher Eval'n	82*	82*	81*	87*	87*	92*	86*		79*	87*	86*	84*	84*	80*	88*	47	86*	64*
1. Teacher Soc. Stud.	71*	70*	70*	74*	76*	81*	80*		65*	75*	78*	76*	73*	74*	72*	47	80*	61*
3. Teacher English	70*	69*	69*	68*	72*	75*	84*		63*	75*	72*	77*	71*	67*	74*	40	84*	56*
2. Teacher Math.	65*	69*	63*	72*	71*	68*	77*		59*	75*	69*	69*	70*	68*	74*	32	77*	49
27. CAT Arithmetic	28	28	30	32	29	31	33		32	61	34	35	37	26	31		33	
42. Nom: Brains	25	25			26		41			30	51*	31		26			41	29
26. CAT Language			26		25		36			44	33	32	33		26		35	

(Continued)

Table E-4 (Continued)

Variable	Total Grade VII	Sex Role		Mental Function			School Location				Peer Acceptance					Family Status		
		M	F	HIQ	AIQ	LIQ	A	B	C	D	Acc	Amb	Avo	Rej	Iso	HPS	APS	LPS
Factor B: Academic Grades (Continued)																		
28. STEP Social Studies						28				42	27	27	25					
23. CAT Reading										36	32							
30. STEP Science										30	27							
45. Nom: Daydreamers				-30														-39*
43: Nom: Wheels											30						27	
40. Rhymes						38*											28	
14. SSHA Sch. Motiv'n			25							26		32		39*	26	37		
44. Nom: Imaginative							31					28					31	
15. CMAS Anxiety												-25				-27		
16. CYS Crit. Educat'n												-35				-34*		
22. CYS Family Tension												-31						
24. DAT Clerical							28						35				28	
34. Mutilated Words													26		27			
49. Nom: Wild Ones										-36				-35				-41*
13. DRT Reaction Time										32*								
32. Gestalt Transform'n										27								
35. CTMM I.Q.										29								
48. Nom: Left Out										-32								-42
50. IPS Peer Status										27								42*
6. JPQ 3: Emotional							-31									-32	-31	
31. Short Words							35										35*	
12. Dotting																		32*
20. CYS Maladjustment																		-29
19. CYS Neg. Soc. Or'n																		-35*
33. Gestalt Completion																-27		
Factor C: Divergent Thinking																		
F	V	V	V	V	V	VIII	VI	VII	V	I	VI	III	X	V	VII	VI	IV	VI
38. Common Situations	60*	60*	61*	69*	66*	58*	58*	39*	60*	51*	71*	59*	69*	68*	53*	66*	57*	54*
41. Seeing Problems	53-	53*	54*	52*	57*	51*	55*	41	54*	54*	50*	55*	63*	65*	52*	55*	55*	42*
37. Consequences	52*	59*	51*	56*	55*	58*	54*	30	54*	37	57*	55*	59*	63*	45*	55*	53*	47*
39. Unusual Uses	35	36	26	31*	30	40*	38		33		31	33	29	57*	42*	45*	38	34
35. CTMM I.Q.						34*				32								
33. Gestalt Completion	29	29			32	26	37	30		39*		37*	28	37			37	29
40. Rhymes						33	38			40				25			36	
3. Teacher English						31				30				25				
12. Dotting						29	53*			43*		50*				33	53*	28
29. STEP Listening						28								34	30			
31. Short Words						25	36*			57*						27	34	28
34. Multilated Words							41*		26	65*		41*		25		28	39*	37*
13. DRT Reaction Time							36*			27		35*			26		37*	
24. DAT Clerical							41*			40*		43*	31			25	40*	32
30. STEP Science														26				
18. CYS Authoritarian														26				-27
23. CAT Reading										41								
26. CAT Language							26			57*								
27. CAT Arithmetic							29										28	
1. Teacher Soc. Stud.								36										
3. Teacher English								32						(45. Nom: Daydreamer)				-27*
4. GPA Teacher Eval'n								35						(47. Nom: Quiet Ones)				-28*
10. JPQ 10: Conformity																		42*

(Continued)

Table B-4 (Continued)

Variable	Total Grade VII	Sex Role		Mental Function			School Location				Peer Acceptance					Family Status		
		M	F	HIQ	AIQ	LIQ	A	B	C	D	Acc	Amb	Avo	Rej	Iso	HFS	AFS	LFS
Factor D: Socially-Oriented Achievement Motivation																		
F	III	IV	II	IV	III	VI	VII	II	III	VII	IX	VIII	VI	III	III	VIII	VII	II
8. JPQ 8: Soc. Morale	71*	72*	75*	69*	76*	60*	75*	47	66*	68*	67*	73*	66*	70*	74*	56*	75*	52*
9. JPQ 9: Independent	-57*	-52*	-52*	-56*	-56*	-34	-52*	-44*	-57*	-46*	-64*	-63*	-39*	-55*	-51*	-66*	-53*	-60*
6. JPQ 3: Emotional	-53*	-48*	-52*	-35	-45*	-44*	-35*	-60*	-47*	-52*	-49*	-45*	-43	-37*	-50*	-39*	-35*	-57*
14. SSHA Sch. Motiv'n	47*	48*	49*	37*	40*	45*	38*	39*	38*	62*	45*	34*	56*	34	32*	45*	39*	55*
7. JPQ 6: Sociable	42*	40*	39*	43*	43*	39*	40*	38*	42*	36*	44*	39*		48*	45	52*	40*	41*
16. CYS Crit. Educat'n	-38*	-28	40	-44*		-54*	-35*	-32*	-30*	-48*	-26	-29	-56*				-35*	-31*
15. CMAS Anxiety	-32	-26	-39			-32		-63*	-29	-25		-31	-37			-26		-65*
5. JPQ 1: Sensitive	30*	26	27*	49*	43*		50*		32			39*	32*	50*	31*	38	50*	
11. JPQ 11: Surgent		-36*	-36															
19. CYS Neg. Soc. Or'n			-29	-32		-27		-44	-25	-32			-49*					-40*
25. DAT Mechanical				-37			-25					-27					-25	
41. Seeing Problems						25												
24. DAT Clerical												41						
45. Nom: Daydreamers												-29						
31. Short Words												28						
4. GPA Teacher Eval'n								31										
1. Teacher Soc. Stud.								30										
2. Teacher Math.								28										
3. Teacher English														25				
21. CYS Soc. Inadequacy								-63*										-60*
20. CYS Maladjustment								-74*										-58*
22. CYS Family Tension			-29					-66*										-53*
49. Nom: Wild Ones										-25								
Factor E: Ineffectively-Functioning Personality																		
F	II	II	VII	II	II	V	III	(II)	II	II	II	IV	II	II	IV	II	III	(II)
20. CYS Maladjustment	79*	82*	73*	75*	80*	71*	82*		80*	77*	83*	73*	81*	80*	80*	83*	82*	
21. CYS Soc. Inadequacy	77*	69*	75*	76*	78*	81*	77*		80*	73*	77*	71*	72*	77*	81*	75*	77*	
22. CYS Family Tension	64*	66*	52*	49*	60*	78*	64*		65*	59*	63*	55*	68*	65*	67*	64*	64*	
15. CMAS Anxiety	50*	48*	45*	67*	49*	29	55*		54*	47*	62*	-35	-52*	50*	35	55*	55*	
6. JPQ 3: Emotional	29	25	39*	59*	31	36	34		30	36	38	44	48*	29		38	33	
10. JPQ 10: Conformity			-27	-36*			-44*											
14. SSHA Sch. Motiv'n				-35			-30				-33						-29	
9. JPQ 9: Independent				31									25					
16. CYS Crit. Educat'n				30								40*						
17. CYS Crit. Youth												26						
7. JPQ 6: Sociable										-27		-25						
19. CYS Neg. Soc. Or'n												33				31	29	
45. Nom: Daydreamers										31								
48. Nom: Left Out										29								

(Continued)

Table E- 4(Continued)

Variable	Total Grade VII	Sex Role		Mental Function			School Location				Peer Acceptance					Family Status		
		M	F	HIQ	AIQ	LIQ	A	B	C	D	Acc	Amb	Avo	Rej	Iso	HFS	AFS	LFS
Factor F: Social Alienation																		
F	VII	VII	VI	VIII	VIII	II	VIII	V	VI	VI	V	VI	VIII	IX	II	IV	VIII	(IV)
18. CYS Authoritarian	62*	58*	61*	59*	58*	60*	60*	48*	57*	45*	62*	51*	42*	51*	63*	59*	60*	
17. CYS Crit. Educat'n	56*	57*	59*	47*	57*	68*	56*	58*	57*	35*	58*	63*	49*	59*	64*	60*	57*	
19. CYS Neg. Soc. Or'n	45*	44	51*		50*	58*	32*	53*	41*	54*	38*	49*	29	61*	56*	52*	33*	
15. CMAS Anxiety	40	39	39		43	65*	37	42	29		33	43*		57*	57*	33	37*	
10. JPQ 10: Conformity	-26*	-31*											-39*					
22. CYS Family Tension				25														
29. STEP Listening				-25												-32		
5. JPQ 1: Sensitive												25						
25. DAT Mechanical												-34						
11. JPQ 11: Surgency								-39*					-41*					
16. CYS Crit. Educat'n										26				35*	25			
48. Nom: Left Out										48*								
47. Nom: Quiet Ones										42*								
45. Nom: Daydreamers										29								
13. DRT Reaction Time								-31										
33. Gestalt Completion								-29										
Factor G: Perceptual Closure																		
F	XI	XI	IX	VII	IX	IX	(VI)	(I)	XI	(I)	X	X	VII	XI	IX	VII	(IV)	IV
34. Mutilated Words	51*	51*	41*	60*	55*	52*			51*		56*		50*	35	53*			26
31. Short Words	46*	33	41*	44*	51*	40*			41*		47*		59*	37	42*	30		38*
24. DAT Clerical	44*	38*	34	60*	42*				50*		43*	25	31	33	50*	45*		43*
26. CAT Language	37		32	34	58*	40			32		49	30	48		47	30		37
27. CAT Arithmetic	27		32	34	43				30			31	27	34	34			
33. Gestalt Completion	24	40*			34*				39*						30			
12. Dotting		38*		35*	36				43*					38*	38*			27
13. DRT Reaction Time	30	34		29	27				26					25	25			
41. Seeing Problems	25				25						26							
40. Rhymes				33	31						28		36					34
23. CAT Reading					38								27		28			
3. Teacher English					28				27									27
2. Teacher Math.					26											26		
9. JPQ 9: Independent						-40*												
8. JPQ 8: Soc. Morale						28												40
5. JPQ 1: Sensitive						36*										47*		49*
25. DAT Mechanical																-48		
11. JPQ 11: Surgency																41*		
32. Gestalt Transform'n												-27				-37		
50. IPS Peer Status												29*						
18. CYS Authoritarian																		36*
17. CYS Crit. Educat'n																		47*

(Continued)

Table E-4 (Continued)

Variable	Total Grade	Sex Role		Mental Function			School Location				Peer Acceptance					Family Status		
	VII	M	F	HIQ	AIQ	LIQ	A	B	C	D	Acc	Amb	Avo	Rej	Iso	HFS	AFS	LFS
Factor H: Peer Recognition																		
F	IV	III	III	III	IV	IV	V	IV	IV	IV	III	V	III	IV	VI	III	V	III
43. Nom: Wheels	72*	72*	75*	67*	73*	62*	69*	73*	62*	69*	64*	72*	46*	76*	36*	76*	69*	67*
46. Nom: Average Ones	68*	66*	70*	69*	67*	61*	64*	70*	62*	66*	71*	62*	43*	76*	43*	67*	64*	54*
44. Nom: Imaginative	57*	53*	59*	38*	59*	61*	44*	53*	55*	63*	48*	54*		56*	35*	57*	44*	56*
42. Nom: Brains	47*	45	52*	30	51*	49*	33	45	55*	54*	36	40*		39*		43	33	37
49. Nom: Wild Ones	45*	42	48*	62*	39	45*	50*	42*	31	43*	56*	54*		53*		51*	50*	57*
50. IPS Peer Status	30*	40*			34*	32*		36*	39*	32*								
45. Nom: Daydreamers	26	53*		41*		37	26	25		34*	37*				57*	-29	26	
47. Nom: Quiet Ones			-25	-25			-35*	-34*			-29*	-37*	-36*	-44*			-35*	
5. JPQ 1: Sensitive												-26	-30					
9. JPQ 9: Independent													33					
48. Nom; Left Out															56*			
36. ISS Family Status							-29										29	
21. CYS Soc. Inadequacy																		-28*
31. Short Words									27									
Factor I: Deviant Age-Mate Behavior																		
F	IX	VIII	VIII	XI	VII	VII	IX	VI	VIII	(VI)	VIII	IX	IV	VIII	XI	V	IX	(V)
48. Nom: Left Out	67*	71*	57*	41*	66*	69*	53*	51*	55*		36*	52*	36*	70*	56*	59*	53*	
45. Nom: Daydreamers	55*	62*	46*	27		56*	44*	58*	60*		29	32*	30*	62*	33	40*	44*	
49. Nom: Wild Ones	41	49*	41	30	50*		37	33	49*			40		39		41	39	
50. IPS Peer Status			-31	-55*			-48*						-43*			-44*	-48*	
47. Nom: Quiet Ones						32*									51*			
19. CYS Neg. Soc. Or'n											-34							
16. CYS Crit. Educat'n							29				-31*				(CMAS Anxiety)		29	
12. Dotting												-28	-35*					
33. Gestalt Completion													-27					
42. Nom: Brains																-27		
1. Teacher Soc. Stud.																-43		
4. GPA Teacher Eval'n																-39		
3. Teacher English																-33		
2. Teacher Math.																-25		
Factor J: Active Conformity																		
F	X			IX	XI	XI	IV		X		IV	VII		VII	VII		VI	
11. JPQ 11: Surgency	44*			50*	52*	44*	66*		43*		48*	68*		46*	47*		66*	
10. JPQ 10: Conformity				29	34*	42*	45*		41*		29*	38*			31*		45*	
24. DAT Mechanical	-29			-50*	-25						-39							
5. JPQ 1: Sensitive				29							54*			26*				
32. Gestalt Transform'n				26										26				
26. CAT Language	27																	
33. Gestalt Completion						27*												
34. Mutilated Words						25								25				
44. Nom: Imaginative						-27												
47. Nom: Quiet Ones						25			-38*									
49. Nom: Wild Ones									27									
14. SSHA Sch. Motiv'n							-33										-33	
36. ISS Family Status														29				
42. Nom: Brains															-30			
16. CYS Crit. Educat'n												27						
18. CYS Authoritarian												-26						

APPENDIX F

DEVELOPMENT OF SOCIOMETRIC FACTOR VARIABLES

The stimulus-items for nomination instruments described in Appendix C were designed to elicit sociometric valuations of boys and girls by their peers in the same junior high school grade. They were asked to nominate one another in response to 46 items. The items described role assignments, positive and negative model value, behavioral approach and control, relational orientations to self and others, creativity versus fantasy, manifest talents, perceived attributes, attitudes toward education, and types of character structure. These sociometric nominations were in addition to a pair of items having to do with age-mate acceptance. The pair of positive and negative valuations was used in the construction of sociographs to represent group structure and to compute IPS Peer Status (Clark & McGuire, 1952; McGuire & Clark, 1952; McGuire, Murphy, & White, 1960). As a result, during 1957 and 1958, a total of 1,242 students in the four communities had scores on 46 different nomination items transformed to stanine values. Later, in 1959, nominations for nine more stimulus-items were elicited in an attempt to measure manifest achievement drive as perceived in a student by peers.

Since the original nomination variables were so numerous, and had only face validity, a decision was made to map the factors underlying the assessments the students had made of one another. More specifically, the hypothesis was that the 46 different kinds of nomination scores could be reduced to a much smaller number of meaningful personality attributes or behavior patterns underlying the manifest sociometric valuations. Some of the factors were expected to be common to boys and girls and others were anticipated as being specific to each sex role. Although this approach had been recommended (Proctor & Loomis, 1951; Lindzey & Borgatta, 1954), only one instance of a factor analysis similar to the one proposed was found. That analysis involved a 19-item questionnaire of the "Guess Who" type administered to 98 fourth-grade children (Mitchell, 1956). Only three factors were identified; namely, social acceptability, aggressive maladjustment, and social isolation.

Factor Analyses of Nomination Variables

Table F-1 for boys, F-2 for girls, and F-3 for the total population of 1,242 students in the seventh grade summarize the three factor structures obtained. For each table, the intercorrelations of the 46 nomination items were computed and centroid factors were extracted by means of programs for the IBM 650 computer. To ensure the probability of factorial invariance under changing samples of stimulus-items, the centroid factors were rotated orthogonally by computer using the normalized varimax procedure (Kaiser, 1958). As indicated in the tables, ten factors were extracted for males and ten for females. Only nine were obtained for the total population. With the exception of nominations for Mechanical in Table F-2 for girls, the communalities indicated that the 46 sociometric items had a reasonably high degree of relevant validity (Guilford, 1954, p. 400).

Loadings of variables selected to define tentative factor scores were marked by an asterisk (*) in each of the three tables. Inspection led to the hypothesis that five factors were common to both sexes, that five were specific to boys, and five specific for girls. As shown, the "common" factors were I, Peer Acceptance; II, Absence of Negative Model Value; III, Social Effectiveness (III for girls and IV for boys); IV, Non-Deviant versus Deviant Behavior (V for girls and III for boys); V, Quiet Dependency (IV for girls and VI for boys).

Matching of Factor Variables

Table F-4 was constructed to test the hypothesis that the five factors were indeed common to both males and females and that five were specific to each sex. After reviewing methods of determining resemblance of loading patterns from different populations (Ahmavaara, 1957; Cattell, 1957, pp. 818-827), a decision was made to correlate loading magnitudes, or vertical columns, from the rotated matrices for males and females in Tables F-1 and F-2. Factors which correlated .90 or above were accepted as matched factors. They were the five factors hypothesized as being "common" to girls and boys. No other factors correlated more than .70; in other words, they had less than 50 per cent common variance. Thus five factors were regarded as being "specific" to each sex role.

Each "common" and "specific" factor was regarded as a second-order sociometric variable for which factor scores were developed. After a consideration of alternative methods of estimating factor scores (Cattell, 1957, pp. 287-296; Trites & Sells, 1955), the unitary method was chosen. The method simply required the summation of the standard scores of representative variables in a factor, retaining the algebraic signs of the variables involved. A program was written to derive new stanine values for each sociometric factor variable. Distributions were obtained for the total population on the "common" factors and for males and females on the "specific" factors. The factor variables have been described under the heading, "age-mate expectations" in Appendix D.

Validity of Sociometric Variables

The preceding factor analyses showed that nomination items were valid in the sense of being relevant to one another and combining to form meaningful factors. Two further types of validation were considered, predictive and construct validity (Cronbach and Meehl, 1955). The degree to which sociometric factor variables predicted several kinds of talented behavior was demonstrated in regression studies to be reported in subsequent appendixes. Another question, that of construct validity, was the extent to which scores on sociometric factor variables could be explained psychologically.

The hypothesis was that, in addition to representing age-mate expectations about one another, each of the sociometric factor scores had a significant regression upon a set of cognitive and noncognitive variables to which the boys and girls had responded. An iterative technique (Greenburger & Ward, 1956) was employed in the multiple regression analyses, the results of which are summarized in Table F-5. After obtaining regressions of each sociometric variable upon the total set of 20 cognitive and 20 noncognitive variables, those variables with highest regression weights were chosen arbitrarily for computing new regressions. If there was a significant difference between multiple R's (Guilford, 1956, p. 400), variables were added to determine the most efficient subset which would predict the criterion as well as the total system. Although not large, each of the five coefficients is significantly different from zero (Snedecor, 1956, p. 417).

Nom 1: Peer Acceptance

Accepted boys and girls in the early adolescent years are described as "ones to be with," "persons you would like to be like," and individuals "you could work with, or ask for help, on a school problem." Apparently they are quite visible to their age-mates and have high peer status (IPS). Their approach to living is regarded as active and, although they do take advice, they are said to be independent in making up their minds. Many of them are regarded as "wheels" by other boys and girls but they tend to regard one another as "average ones." Instead of being impulsive, they are thought of as persons who think before they act and in whom one could confide a personal matter. Their peers frequently see them as persons with a good deal of talent, imaginative, able to use words effectively, sometimes as potential actors, capable in sports, and having ability in mathematics.

These age-mate expectations are associated with certain psychological attributes. In terms of perceptual strategies, the accepted ones are quick and accurate with good closure on symbolic materials. They are able to comprehend and draw conclusions from scientific data and can come forth with a good many ideas in a short time, although they may not be as aware as some other boys and girls that problems exist. By and large, they represent themselves as being stable, positive toward teachers, and motivated to work in school. Although they see themselves as lively, conforming mixers, individuals with high peer acceptance often feel they can be dominant, competive, and critical of the behavior of their age-mates. Such boys and girls more frequently are from middle- than lower-class family backgrounds.

Nom 2: Absence of Negative Model Value

Persons with low stanine scores on this sociometric factor variable are regarded as negative models by their peers. They are persons "you would not like to be like" not to be asked "for help if you had to work on a problem,"and as ones "who have their own friends and you have yours." They are said to be impulsive and not to be trusted with personal matters. Some are regarded as daydreamers, others as "wild ones," and still others are said to be "left out" of things on purpose.

The absence of negative model value does not necessarily mean acceptance by one's peers. Such persons are good in arithmetic, quick and accurate with letter and number combinations, but lack verbal facility. Although they represent themselves as being mentally healthy individuals, they see themselves as being sensitive, serious and quiet, with some lack of ability to interpret the intentions of others.

On the other hand, negative models (with low stanine values) often are fluent with words but frequently are inaccurate with printed letters and figures. They have low scores on arithmetic fundamentals and reasoning. They represent themselves as being maladjusted persons but they see themselves as tough, surgent, and able to form person-to-person relationships.

Nom 3: Social Effectiveness

In terms of age-mate expectations, the socially effective boy or girl is said to "enjoy everything," be "self confident," and show initiative ("see things to do and go ahead and do them"). Their peers believe such persons enjoy their school work but they also think that some are afraid of failing or of being criticized for not coming up to standards. In the judgments of age-mates, most effective individuals genuinely care about the way their behavior affects other people and have solid moral principles. Some are viewed as regarding everything as being "right" or "wrong." By and large, the effective ones can be counted on to do what is expected but some can be expedient while keeping within the rules.

By and large, the effective individual as judged by peers is high in cognitive apprehension or efficiency in attending to and concentrating upon verbal stimuli during the learning process. They are dextrous, have high speed of perceptual closure, and recognize symbols quickly but are less accurate in visual figural recognition. Like accepted peers, they can deal with scientific materials. Psychologically, they are relatively less anxious than their age-mates and they are quite acceptant of the school and its teachers. Again like accepted age-mates, the effective boys and girls more frequently are from middle-class homes than from families of upper-lower or lower-lower class.

Nom 4: Non-Deviant vs. Deviant Behavior

Deviant behavior, characterized by low stanine values, is defined by dislike of school, lack of initiative,and doing "enough to get by." Such persons frequently are regarded as amoral, doing "whatever they feel like doing" and not caring "what other people think." At the same time, their peers seem to believe that deviant boys and girls desire approval.

The non-deviant, with high stanine values, is not necessarily looked upon as an accepted or an effective person by age-mates. Like students seldom named as negative models, they tend to be quick and accurate and to do well in arithmetic achievement. They represent themselves as being sensitive and adjusted, motivated scholastically, on the one hand, but tense and nervous, on the other. More often than not the non-deviant is from the lower-class family background.

Boys and girls nominated for deviant behavior more frequently are from middle- than lower-class homes. They represent themselves as being relaxed and casual but report borderline adjustment and a tough-minded outlook. Very frequently they are low in clerical accuracy, have ineffective study habits and attitudes, and fail to do well on arithmetic achievement.

Nom 5: Quiet Dependency

Quiet dependency is the least well-defined of the sociometric factor variables. Persons with high stanine values are regarded as "quiet ones," often "left out" of peer activities, and dependent upon their parents and older people for advice and approval. Such individuals seldom are nominated as "wheels" or "wild ones" in the age-mate societies of the four communities.

In terms ofthe psychological tests, such persons are relatively slow in discriminative reactions and lack speed and accuracy with symbols. They tend to be emotionally sensitive, retiring and thoughtful, and somewhat inadequate socially, but under strong inner controls. More frequently such individuals are from middle- rather than lower-class families.

Table F-1

FACTOR LOADINGS ROTATED ORTHOGONALLY BY VARIMAX METHOD FOR 46 NOMINATION VARIABLES
(N = 643 males)

Variables	Factors										
	I	II	III	IV	V	VI	VII	VIII	IX	X	h^2
1. Brains	62	-02	-07	-34	31*	-07	05	10	02	16	65
2. Wheels	66	-25		-19	-02	29	-19	-06		-04	66
3. Imaginative	58	-12	01	-16	05	-04	-03	45*	15		61
4. Daydreamers	10	-58	20	11	-06	-20	-07	10	13	-02	48
5. Average	51	-30	12	-05	-22	10	-03	-07	25*	-20	53
6. Quiet	-07	-06	-04	-05	-02	-49	05	-02	-01	01	26
7. Left Out	-10	-63	14	11	09	-35	-07	-06		-04	57
8. Wild	16	-62	23	08	-08	27	01	02	27*	-02	62
9. Index of Peer Status	49	21		-11	-35*	-09	01	-01	10	-01	44
10. Musical	33	-08		-19	-03	11	-43*	07		01	35
11. Mechanical	55	-16	03	-15	-03	02	23	30*	-03	13	52
12. Verbal	70	-02	-04	-29	35*	-03	-07	02	03	07	71
13. Hidden Talent	60	-12		-25	02	03	-14	29*	-08	-05	55
14. Work With	72	02	-06	-31	01	-03	-02	-10	-07	13	66
15. Not Ask for Help	-10	-74	19	04	-02	-03	10	03	-16	06	63
16. Ask to Party	67	02	05	-20	-39*	01	-07		-03	02	64
17. Not Asked to Party	12	-71	12	-03	07	19	-03	-02	-12	06	59
18. Knows Wants--Active	71	-16		-24	07	09	-04	06	-02	-06	61
19. Avoids Trouble--Passive	29	-39	01	-12	-06	-13	12	10	-07	09	30
20. Personal Model	54	02	08	-15	-23	-02	-04	01		04	38
21. Neg. Personal Model	08	-67	16	-04	03	-02	-02	01	-04	-04	49
22. Behavior Model	72	07	03	-25	-11	04	02	-04	-08	-16	64
23. Neg. Behavior Model	-02	-80	10	-02	11	03	01	03	-03	04	67
24. Artistic	47	-05	-03	-19	-01	10	-11	46*	-06	-03	50
25. Athletic	59	-03	05	-22	-24	23	-03		-01	-18	54
26. Math Ability	66	08	-06	-40	23	-04	-03	-04	12	02	68
27. Actor	58	-15	02	-16	01	12	-27*	18	02	-09	51
28. Adult Orientation	27	-34	05	-10	09	-28	-16	04		-21	36
29. Peer Orientation	19	-45	12	-06	-13	-12	-18		05	-25*	39
30. Independent Orientation	66	-25	-06	-16	04	-03	05	06	13	-25*	61
31. Impulsive	09	-74	17	08	-06	05		02	24*	-09	67
32. Affect Neutrality	60	-13	-05	-25	02	-19	-02	06	08	-26*	56
33. Get By	-05	-21	79			-06	06	-05	08	01	68
34. Enjoys Everything	37	04	03	-76	-04	01	-08	04	02	04	73
35. Desires Approval	-03	-21	71	-18		-11	-03	-02	-19	-02	63
36. Self-Confident	35	06	-02	-80	04	07	-03	-03	08	03	79
37. Does Things on Own	33	-01	11	-76		01	-09	04	06	04	72
38. Has to be Told	-10	-24	81	02	-04	-03	-09	-01	-11	03	74
39. Dislikes School	-02	-20	83	-02	-05	11	03		11	03	76
40. Likes School	33	08	-09	-75	09	-09	-08	01		10	71
41. Works Because Has To	13	-08	40	-51	-11	-10	01	07	-02	-03	47
42. Amoral	05	-28	67	-17	07	21		07	14	-13	66
43. Expedient	22	-11	40	-44	04	21	01	03	05	-25*	53
44. Conforming	32		26	-48	-13	04	14	02	-04	-30*	53
45. Conscientious	22	-02	15	-66	04	-09	-02	12	-06	-10	54
46. Rational Altruistic	33	09		-67	-14		04	04	-12	-15	62

*Loadings of variables selected to define tentative factor scores:

I. Peer Acceptance(PA) = to FI, Girls
II. Negative Model Value(NMV) = to FII, Girls
III. Deviant Behavior(DB) = to FV, Girls
IV. Social Effectiveness(SE) = to FIII, Girls
V. Avoided Brains(AB) Specific

VI. Quiet Dependency(QD) = to FIV, Girls
VII. Artistic Temperament(AT) Specific
VIII. Creative Imagination(CI) Specific
IX. Overt Impulsiveness(OI) Specific
X. Expedient Operator(EO) Specific

Table F-2

FACTOR LOADINGS ROTATED ORTHOGONALLY BY VARIMAX METHOD
FOR 46 NOMINATION VARIABLES
(N = 608 females)

Variables	Factors										
	I	II	III	IV	V	VI	VII	VIII	IX	X	h^2
1. Brains	50	-05	35	12	06	56*	09	02	-02	10	72
2. Wheels	57	-31	35	-17	07	16	04	01	-17	20	68
3. Imaginative	53	-12	30	-07	06	25*	16	07		-22	54
4. Daydreamers	07	-42	05	07	-19	-05	06		-04	-38*	37
5. Average	54	-35	19	-18	-01	-10	14	-13	-15	-11	57
6. Quiet	-06	04	-03	57	-01	02	-01	-02	05	-02	33
7. Left Out	-15	-54	-08	33	-12	-01	02	19	-05	01	49
8. Wild	14	-59	02	-24	-01	-07	17	-15	-18	-14	53
9. Index of Peer Status	53	29	10	09		-09	04	-15	01	-12	43
10. Musical	61	-20	28	-11	-02	-01	-05	21	10	-03	56
11. Mechanical	07	-05	08		03	05	22			-01	07
12. Verbal	54		35	05	08	53*	14			-05	74
13. Hidden Talent	63	-11	33	-02		15	-13	20	13	-10	62
14. Work With	60	06	32	20	03	33*	04	-14	01	05	64
15. Not Ask for Help	-02	-65	-05	03	-23	02	-04	03	05	10	49
16. Ask to Party	70	-01	18	04	-04	-02	01	-13	-01	-10	56
17. Not Asked to Party	11	-68	15	-03		06	-18	-03		04	54
18. Knows Wants--Active	63	-21	36	-12	03	18	04	07	-03	15	65
19. Avoids Trouble--Passive	35	-29	13	28	-04	11	02	-07	06	02	32
20. Personal Model	58	07	10	-22	-01	-04	-01	-04	-04	-02	35
21. Neg. Personal Model	13	-64	07	-03	-19	01	05		10	-03	49
22. Behavior Model	70	02	24	01	-01	09	07	-07	-03	08	57
23. Neg. Behavior Model	-04	-74	03	-03	-11	11	07	05	-06	05	58
24. Artistic	45	-07	26	-09	09	29*	-02	12	11	05	41
25. Athletic	39	-10	19	-16	09	10	09	-06	-06	14	28
26. Math Ability	47	04	35	07	10	58*	19	03	-04	02	74
27. Actor	64	-23	29	-16	01	13	08	18	-05	-16	65
28. Adult Orientation	38	-11	21	32	-12	12	19	25*	-01	-03	43
29. Peer Orientation	31	-37	15	15	-10	-23	02	13	-15	-16	41
30. Independent Orientation	61	-15	30	01	01	13	31*	15	-12	01	64
31. Impulsive	11	-57	-05	-04	-13	-12	30*		-05	-27*	54
32. Affect Neutrality	58	01	26	27	01	12	30*	15	-05	03	60
33. Get By	-07	-14		11	-65	01	-05	-07	-02	-05	47
34. Enjoys Everything	33	-03	80	-11	02	06	13	-01	04	-02	78
35. Desires Approval	05	-14	28	16	-59	-02	-12	07	08	03	51
36. Self-Confident	34	-01	76	-05	03	17	18	03	07	09	77
37. Does Things on Own	27	-05	80	-02	-01	13	12	02	-01	03	75
38. Has to be Told	-10	-16	01		-70	-09	-02	02	10	-07	55
39. Dislikes School	-02	-17	-02	-17	-65	-02	09	03	-19	04	53
40. Likes School	28	05	79	05	08	16	19	-04	12	03	79
41. Works Because Has To	23	-07	57	06	-29	-04	03	-01	-09		48
42. Amoral	10	-35	25	-24	-47		01	-02	-40*	-10	64
43. Expedient	25	-26	54	-14	-22	07	-04	03	-35*		62
44. Conforming	38	-07	59	-01	-13	-03	-12	-01	-18	-12	58
45. Conscientious	24	-01	68	04	-13	15	-02	01		-07	56
46. Rational Altruistic	31		76	09			-04	03	-07	-03	70

*Loadings of variables selected to define tentative factor scores;

I. Peer Acceptance (PA) = to FI, Boys
II. Negative Model Value (NMV) = to FII, Boys
III. Social Effectiveness (SE) = to FIII, Boys
IV. Quiet Dependency (QD) = to FVI, Boys
V. Deviant Behavior (DB) = to FIV, Boys
VI. Academic Competence (AC) Specific
VII. Personal Autonomy (PA) Specific
VIII. Adult Oriented (AO) Specific
IX. Amoral Expedient (AE) Specific
X. Impulsive Daydreamer (ID) Specific

Table F-3

FACTOR LOADINGS ROTATED ORTHOGONALLY BY VARIMAX METHOD FOR 46 NOMINATION VARIABLES

(N = 1242 males and females)

Variables	Factors									
	I	II	III	IV	V	VI	VII	VIII	IX	h^2
1. Brains	49	-03	35	06	07	51	-14	-11	-06	66
2. Wheels	61*	-27	28	03	-30*	19	-01	-04	-03	65
3. Imaginative	54*	-13	24		-01	14	-20	-30	14	53
4. Daydreamers	10	-53*	-05	-21	13	-11	-04	-11	16	41
5. Average	56*	-32	13	-08	-19	-08	-02	06	18	52
6. Quick	-05	-01	01	01	53*	02	01	03		29
7. Left Out	-13	-61*	-10	-14	29*	06	10	-03	02	52
8. Wild	15	-60*	-04	-17	-30*	-05	-15	06	26	59
9. Index of Peer Status	56*	24	11		10	-15	-06	06	01	42
10. Musical	45	-13	26	02	-11	02	16	-33	-03	43
11. Mechanical	25	-12	04	-09	-04	06	-46	-04	02	31
12. Verbal	55*	-02	34	08	05	50	-03	-15	01	71
13. Hidden Talent	57*	-12	29	-01		12	-08	-37	-07	58
14. Work With	64*	03	32	06	10	31	-05	04	-10	64
15. Not Ask for Help	-08	-69*	-06	-21	02	-02	-07	01	-13	56
16. Ask to Party	74*	01	20	-03	01	-12	-03		-10	61
17. Not Asked to Party	10	-67*	09	-06	-14	05	03	-03	-15	52
18. Knows Wants--Active	63*	-18	32	02	-15	23	-04	-12	-05	63
19. Avoids Trouble--Passive	31	-35	12	-02	18	05	-12	-01	-10	29
20. Personal Model	57*	05	13	-04		-02	-02	-02		34
21. Neg. Personal Model	09	-66*	07	-15	-02	03	-01	-02	-05	48
22. Behavior Model	71*	05	26		-04	11		01		59
23. Neg. Behavior Model	-05	-77*	03	-10	-05	11	-02	-03	-03	62
24. Artistic	42	-05	23	05	-05	15	-21	-37	-01	44
25. Athletic	52*	-04	20	-02	-24		-19	04	03	41
26. Math Ability	52*	06	39	08	04	52	-10	-05	08	72
27. Actor	59*	-19	25	01	-14	10	05	-30	09	58
28. Adult Orientation	33	-26	19	-06	29*	15	16	-09	14	37
29. Peer Orientation	29	-42	13	-09	09	-13	24	-01	15	39
30. Independent Orientation	61*	-22	26	05	01	21	-06	-04	25	61
31. Impulsive	10	-69*	-07	-16	-04	-07	-10	03	29	61
32. Affect Neutrality	59*	-08	29	05	23	18	03	-02	22	57
33. Get By	-07	-18	-01	-75*	08	02	-05	05	03	61
34. Enjoys Everything	33	01	79*	01	-05	04	-09	-08	01	76
35. Desires Approval	02	-19	23	-65*	13	-03	10	-01	-16	57
36. Self-Confident	32	03	79*	04	-07	14	-12	-02	-02	77
37. Does Things on Own	29	-02	78*	-06	-03	11	-10	-06	01	72
38. Has to be Told	-10	-22	-02	-77*	04	-09	-03	-03	-06	66
39. Dislikes School	-03	-19	-01	-77*	-16	-02	-14	04	10	69
40. Likes School	27	06	78*	11	10	16	-08	-05	-02	74
41. Works Because Has To	20	-08	55*	-34	06	-06	04	01	-03	48
42. Amoral	07	-31	21	-60*	-27	03	06	-04	16	62
43. Expedient	25	-18	50*	-34	-27	09	14	-03	10	56
44. Conforming	37	-04	56*	-20	-06	-06	15	-01	04	52
45. Conscientious	22	-01	67*	-13	05	08	02	-11	04	54
46. Rational Altruistic	33	04	73*	01	03	-02	11	-02	-02	66

*Loadings of variables selected to define tentative factor scores:

	Common Factors:	Matched Factors:
I.	Peer Acceptance....................................	FI Girls and FI Boys
II.	Negative Model Value................................	FII Girls and FII Boys
III.	Social Effectiveness................................	FIII Girls and FIV Boys
IV.	Deviant Behavior....................................	FV Girls and FIII Boys
V.	Quiet Dependency....................................	FIV Girls and FVI Boys

TABLE F-4

INTERCORRELATIONS OF FACTOR LOADINGS ROTATED ORTHOGONALLY BY VARIMAX METHOD FOR 46 NOMINATION VARIABLES (N = 1242)

BOY FACTORS	GIRL FACTORS									
	I	II	III	IV	V	VI	VII	VIII	IX	X
I	92*†	53	32	-18	70	56	32	00	06	20
II	55	95*	60	03	25	36	02	-13	11	21
III	-61	-21	-26	-18	-97*	44	-34	-18	-32	-14
IV	30	-56	-97*	09	-30	-34	-07	03	-09	-29
V	-12	-14	14	13	05	70	18	40	08	23
VI	24	22	16	-91*†	05	16	-07	-21	-38	17
VII	-34	02	12	18	-14	-01	09	-48	-18	11
VIII	17	09	07	-18	22	22	04	38	21	-23
IX	07	-05	-01	-32	12	-08	62	-10	-42	-44
X	-19	05	-10	08	03	34	-07	-29	52	19

*Factors selected as matched factors.

†Factor loadings plotted to insure exclusion of variables for factor scores that were distant to the line.

Table F-5

REGRESSION OF SOCIOMETRIC FACTOR VARIABLES UPON COGNITIVE AND NONCOGNITIVE VARIABLES

(Decimal Points Omitted)

Cognitive and Non-Cognitive Variables	Sociometric Variables				
	I Acceptance	II Model Value	III Effective	IV Non-Deviant	V Dependency
Regression Variance, R^2	24	10	20	11	10
Multiple Correlation, R	49	32	44	33	32
1. CTMM Mental Function					
2. STEP Listening			12		
3. DAT Mechanical Reasoning			-05		
4. Gestalt Transformation					
5. Rhymes (word fluency)		-11			
6. Unusual Uses					
7. Consequences					
8. Common Situations	06		06		
9. Seeing Problems	-06				
10. Mutilated Words	06		09		
11. Gestalt Completion			-08		
12. Short Words	10		13		
13. Dotting	13		13		
14. Disc. Reaction Time					-07
15. DAT Clerical Accuracy	12	08		08	-07
16. CAT Reading					
17. CAT Language					
18. CAT Arithmetic		16		22	
19. STEP Social Studies					
20. STEP Science	10		08		
21. JPQ 1:Sensitivity vs.Toughness		14		08	16
22. JPQ 2: Nervous Tension				11	
23. JPQ 3: Emotional vs. Stable	-11				
24. JPQ 4: Will Control					07
25. JPQ 5: Impatient Dominance	08				
26. JPQ 6: Sociable vs. Withdrawn					
27. JPQ 8: Socialized Morale					
28. JPQ 9: Independent Dominance					
29. JPQ 10: Energetic Conformity	09				-14
30. JPQ 11: Surgency vs. Desurgency		-12			
31. SSHA Scholastic Motivation	06			09	
32. CMAS Anxiety			-10		
33. CYS Criticism of Education	-10		-06		
34. CYS Criticism of Youth	08				
35. CYS Authoritarian Discipline					
36. CYS Neg. Social Orientation					
37. CYS Maladjustment		-23		-05	
38. CYS Social Inadequacy		09			07
39. CYS Family Tension					
40. ISS Family Status	09		09	-10	06

APPENDIX G

INDICATORS OF TALENTED BEHAVIOR

The next focus of the research was upon indicators, or measurable dimensions, of talented behavior in the junior high school years. This step was made possible by analytic studies of the variables in Appendix E and the development of sociometric factor scores in Appendix F. Two complementary techniques were employed, multiple regression and factor analysis, to identify potential indicators and to map their relationships. Throughout this phase of the Human Talent Project, a general proposition derived from a model for research in human talent was being tested.

General Proposition and Research Model

The general proposition to be tested was that variations in talented behavior among junior high school students could be explained, in large part, by three categories of information about the boys and girls in the four school locations. In terms of the model for research in human talent, personally significant and socially-valued performances and competencies were regarded as talented behavior. They were expected to be a function of:

(a) pertinent cognitive, perceptual, and psychomotor abilities (Bloom, 1956; Ferguson, 1954, 1956; Guilford, 1956, 1959; Wilson, 1958);

(b) elements of personality and motivation, especially expectations about one's own behavior and probable responses of other persons to it (Atkinson, 1957; Sears, 1951; Stern, Stein, & Bloom, 1956);

(c) ways in which boys and girls are valued and have pressures imposed upon them by cultural agents such as parents, age-mates, and teachers in the community (Goethals, 1958; Haggard, 1957; McGuire,1956).

As a consequence of sex-role identification and the sex-typing of socialization pressures upon males and females (More, 1955; Parsons & Bales, 1955), the research group anticipated that the three classes of variables might combine in different ways for boys and girls. Further variability was expected among the four school locations since the communities provided somewhat different contexts and the patterns of educational experiences and expectations were not the same. Nevertheless, some indicators of talented behavior common to both sexes and across communities were anticipated.

Methodologically, multiple regression and factor-analytic techniques were combined in this inquiry into the indicators of dimensions of talented behavior. The multiple regression approach provided a useful means of determining which of the potential indicators, termed dimension or predictor variables, accounted for a significant portion of the variance in several kinds of performance or criterion measures. Then factor-analytic procedures were employed to determine whether or not the indicators of talented behavior fitted into classes in accord with the proposition stated above. As a result, second-order variables were derived, each with factor scores, for subsequent phases of the Human Talent Project.

Multiple Regression Analyses

The multiple regression approach permitted the determination of the relative strength of the relation between a dependent or criterion measure and a set of independent or predictor variables. For this preliminary study, each criterion of valued performance was a measure of educational achievement. Decisions about the inclusion or exclusion or potential indicators of talent were made on the basis of preceding analyses. Among the 35 finally selected, 14 were cognitive, perceptual, or psychomotor variables, 14 had to do with motivation and other elements of personality, and 7 reflected pressures imposed upon a boy or girl by parents and by peers. As the analyses proceeded, three predictor variables (CYS Criticism of Youth, CYS Social Inadequacy, CYS Family Tension) were discarded since they appeared to add relatively little unique information.

An iterative technique (Greenberger & Ward, 1956) was employed for the multiple regression analyses.[1] The technique, which is a modification of the Kelly-Salisbury method, was adopted since the independent variables were so numerous. A program, developed principally by Ward, was utilized on the IBM 650 computer. Iteration was carried out to that point in the program where the sums of squares of regressed values, R^2, were not raised more than a specified criterion value of .0005 in the analysis. The stop criterion provided a solution which avoided overfitting the regression line. This solution was regarded as one which would have minimum shrinkage upon application of the regression weights to subsequent samples.

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[1] A complete set of tables may be found in the Supplementary Appendixes.

The iterative multiple regression procedure (Bottenberg, 1960; Greenberger & Ward, 1956) served to express each of a set of criterion observations of talented behavior in terms of a weighted sum of predictor scores on the indicators or dimensional variables for the corresponding individuals. Theoretically, the regression equation took the form

$$Y' = w_0X_0 + w_1X_1 + w_2X_2 + \dots + w_kX_k \qquad (1)$$

where $X_1, X_2, \dots, X_k$ were a set of $\underline{k}$ predictor or explanatory variables, $w_0, w_1, w_2, \dots, w_k$ were weights, Y' was the predicted criterion measure and X_0 was a dummy variable taking the value 1 for each individual. The iterations and the stop criterion obtained a set of beta weights which maximized the squared multiple correlation, R^2 or $(MCC)^2$, between the criterion measure and a weighted set of predictor variables. Since all of the variables were expressed in stanine values rather than raw scores, the obtained beta weights or regression coefficients were directly comparable. Variables with regression weights of zero at the conclusion of the iterations were regarded as linear combinations of those with weights. Thus it was not necessary to specify in advance the subsets of variables which were linear combinations of others. This was regarded as an important justification for the method employed.

Being an exploratory study, no systematic attempt was made to determine the minimum number, or most efficient subset, of variables which would predict the criterion as well as the sets shown in the tables. Nevertheless some tests were carried out. The procedure began by selecting those variables with highest regression weights for computing new regressions. Then tests of significance between multiple R's for the total set and the new subset were computed (Guilford, 1956, p. 400), using the formula

$$F = \frac{(R_1^2 - R_2^2)(N - m_1 - 1)}{(1 - R_1^2)(m_1 - m_2)} \qquad (2)$$

where R_1 = multiple R of the "total set" with a larger number of variables
R_2 = multiple R of the "subset" with one or more variables omitted
m_1 = larger number of independent variables
m_2 = smaller number of independent variables
N = number of subjects in the population studied

Degrees of freedom for the F test were $(m_1 - m_2)$ and $(N - m_1 - 1)$. If the F test was significant, variables were added and the process was repeated until a subset was obtained which predicted the criterion as well as the total set of independent variables. By and large, variables with regression coefficients of .08 or greater tended to remain in the system and some as low as .05 were retained in the most efficient subsets.

Another procedure was employed to test for a significant difference between two multiple correlation coefficients for the same criterion when the predictors were different. Instead of dropping variables from an original set of k predictors, sets of k_i and k_j variables each were intercorrelated with the same criterion measure for N subjects to provide the matrices to begin the iteration procedures. In each matrix of $(k_i + 1)$ or $(k_j + 1)$ variables, the correlations of the predictors with the criterion in the last column were regarded as validity coefficients. In each case, a proportion of the criterion variance was not accounted for by the predictor variables. This quantity was $(1 - R_i^2)$ for the smaller multiple correlation and $(1 - R_j^2)$ for the larger coefficient. The test of significance was based upon the obtained deviations from regression (Talbott, 1960).

$$F = \frac{1 - R_i^2}{1 - R_j^2} \qquad (3)$$

and the degrees of freedom were $(N - k_i - 1)$ and $(N - k_j - 1)$, respectively, for the larger and smaller deviations from regression (Rao, 1952, p. 224).

The significance of the obtained multiple correlation coefficients was tested by comparing the sums of squares due to regression with those due to deviations (Snedecor, 1956, pp. 417-418; Walker & Lev, 1953, pp. 323-324). With k predictor variables, the test of significance was

$$F = \frac{R^2}{1 - R^2} \cdot \frac{N - k - 1}{k} \qquad (4)$$

employing (k) and (n - k - 1) degrees of freedom, respectively, for the regression and deviation values. Since all of the regressions obtained were significant, no entries were made upon the tables. The most important test of significance, then, was that between coefficients for the same criterion when the sets of predictors were present

Analyses by Community and Sex Role

Two tables were selected from among those in the Supplementary Appendixes to illustrate variations according to school location for boys and for girls. Table G-1 was designed to show the regressions of GPA Teacher Evaluations, or grades assigned to students in "content" courses at the end of the seventh grade, upon 32 selected dimensional variables which were regarded as potential indicators of talented behavior. All of the multiple correlation coefficients were highly significant but the set of predictor variables with non-zero loadings varied among communities (A, B, C, D) and between males (M) and females (F). For example, in community A, boys assigned the highest grades by teachers appeared to be accepted by their peers, have a good deal of fluency with words, be regarded as effectively functioning persons by age-mates, not looked upon as negative models, and have other attributes not necessarily similar to the girls. On the other hand, the girls evaluated most highly in community A not only were accepted by and regarded as effective by their age-mates but also were motivated scholastically, possessed good perceptual closure upon symbolic material, and were not looked upon as deviant individuals by their peers.

Table G-1 not only permitted comparisons between boys and girls but also from community to community which could be linked with the description of variables in Appendix D and the analytic studies of the variables in Appendix E. For example, the matching of factor loadings in Table E-4 of the latter appendix showed that academic grades in community B were closely linked with scholastic achievement measured by standard tests. In grade VII, students in community A were in a large junior high school while those in community B were scattered in seventh-grade classrooms of elementary schools. Both sets of pupils were in self-contained classrooms but the teachers in community A were together in one building and could communicate with one another each day. Parallelling these differences in school locations, Table G-1 revealed that teachers in community B tended to put more emphasis upon cognitive and perceptual abilities than in community A. Thus the table could be used to draw a number of inferences about academic grades assigned to boys and girls in different school locations, especially when employed in conjunction with data, descriptions, and analyses summarized in other appendixes.

Table G-2 was designed to show the regressions of performances in a standard test of achievement, CAT Arithmetic, upon the potential indicators of talented behavior among the school locations and between the sexes. Similar tables were constructed for CAT Reading, CAT Language, STEP Social Studies, and STEP Science and placed in the Supplementary Appendixes. As in Table G-1, the sets of predictor variables selected by the iterative procedure for multiple regression accounted for a remarkably high proportion of the variance in the criterion measure. Results were similar for each of the remaining achievement measures with variations in zero and nonzero weights from criterion to criterion, among communities, and between males and females. The cognitive and perceptual variables more frequently had appreciable beta weights than in the preceding study of teacher grades. Nevertheless, the noncognitive self-report and sociometric factor variables were well represented.

Alternative Hypotheses

At this point in the analyses of the data, two possibilities had to be considered. The first hypothesis was that the sex-typing of socialization pressures and the influences of school location upon ways in which the three proposed classes of variables combined were more important than the research team had first postulated. If so, an unique combination of indicators or dimensional variables to explain and predict talented behavior would have to be worked out for males and females of each community.

An alternative possibility followed from a consideration of the nature of the three categories of variables proposed in the model for the study of talented behavior. Potential abilities, expectancies about one's own and other's behavior, and pressures of older persons and peers all were represented by variables with beta weights contributing to the regression variance in each of the analyses. During the iterations, the analytic procedure could be picking up certain of the variables in a category and be rejecting others closely associated. In other words, the variables picked up by the iteration process could vary from one analysis to another, yet represent the same underlying factors. An examination of the printouts from the computer and the tables led to the hypothesis that such was the case. The remaining regression studies and factor analyses were carried out with these two possibilities in mind.

Analyses by Sex Role

Table G-3 (for boys) and G-4 (for girls) were devised to summarize the regressions of six measures of educational achievement at the end of the seventh grade upon each of 31 potential indicators of talented behavior. One variable, CYS Criticism of Youth, was omitted from both tables since zero values were obtained for it in all of the analyses. The seventh column in each table permitted a multiple regression analysis of STEP Listening, the proposed measure of cognitive apprehension or efficiency in attending to and concentrating upon verbal stimuli during the learning process.

Combining the data for the four school locations yielded regression variances somewhat lower than in the analyses by community and sex role. Nevertheless, the multiple correlation coefficients were larger than those usually obtained, ranging from .71 to .78 for boys and from .72 to .81 for girls. GPA Teacher Evaluations of both boys and girls clearly were related to attributes age-mates assess in their nominations and to scholastic motivation measured by self reports. In general, teachers appeared to attach greater value to general intellectual qualities (CTMM) and ideational fluency (Common Situations) for boys and to more specific aptitudes, such as sensitivity to problems and verbal facility (Rhymes) for girls. On the other hand, when the criterion was a standard achievement test, the cognitive variables assumed relatively greater importance in terms of beta weights although the tables showed variations from one criterion to another and between males and females. Again the tables permitted a number of comparisons as well as inferences by relating them to data in other appendixes.

The regression analysis of STEP Listening omitted three multi-factor tests, CTMM, DAT Mechanical, and Rhymes, in order to obtain a clearer picture of what was involved in the postulated measure of cognitive apprehension. Junior high students who could attend to and concentrate upon verbal stimuli were able to shift the function of a part of an object and use it in a new way (Gestalt Transformation) and to shift from one class idea to another (Unusual Uses). They tended to be from middle- rather than lower-class family backgrounds (ISS) and to be non-authoritarian in outlook (CYS).

Boys who comprehended verbal material most successfully also appeared to have good perceptual closure on figures (Gestalt Completion), high scholastic motivation (SSHA), and be evaluated as effective persons by their peers. Girls, on the other hand, seemed to be sensitive to problems and positively oriented socially (CYS).

Analyses for the Total Population

The last link in the chain of evidence to explore the contributions of and to validate the indicators, or dimensional variables, with reference to certain criterion measures of talented behavior involved analyses for the total grade VII population. Two illustrations were chosen. In Table G-5, STEP Listening replaced CTMM Mental Function which, in turn, was analyzed in the seventh column for its predictors. In Table G-6, the multi-factor cognitive variables, CTMM Mental Function, STEP Listening, DAT Mechanical Reasoning, and Rhymes, all were omitted from the analysis. Rhymes, presumed to measure verbal facility or word fluency, was included among the deleted variables because its actual factor content was as yet unknown. Table G-6 thus permitted an estimation of the reduction in the regression variance accounted for by the dimensional variables when all complex cognitive measures were left out.

In Table G-5 for the total seventh-grade population, the introduction of STEP Listening and deletion of a measure of intelligence (CTMM) had some interesting consequences. The new variable had relatively large weights for the criterion measures in the same STEP battery, Social Studies and Science, with accompanying increments in the regression variance. STEP Listening also contributed to an explanation of GPA Teacher Evaluations along with attributes assessed by age-mates, ability to recognize symbols (Mutilated Words), verbal facility (Rhymes), and scholastic motivation (SSHA). As a criterion measure, CTMM Mental Function regressed, for the most part, on four variables; namely, ability to attend to and concentrate upon verbal stimuli (STEP Listening), spatial orientation and reasoning (DAT Mechanical), verbal facility (Rhymes), and variations in culturally-typed learning experiences (ISS).

When the multi-factor cognitive tests were deleted, as in Table G-6 the regression variance attributable to sets of predictors was reduced but much less than anticipated. In general, the beta weights for Gestalt Transformation, Unusual Uses, Seeing Problems, Mutilated Words, and Short Words all became larger. These changes seemed to indicate that conceptual redefinition, flexibility, sensitivity to problems, and two aspects of closure upon symbolic materials were important elements of cognitive behavior. Variations in cultural background and socialization pressures, index by ISS Family Status, appeared to play a part in explaining performances in reading, social studies, and science as measured by objective tests of achievement. Regression weights for the other noncognitive variables shifted only to a very small degree.

Summary of Regression Analyses

Table G-7 was constructed to provide a convenient summary of the multiple correlation coefficients obtained from the several regression analyses for each of the six criterion measures. Entries were taken not only from Tables G-1 through G-6 but also from tables in the Supplementary Appendixes which they serve to illustrate. The coefficients measure the degree of joint linear association among all the variables, both criterion measures and indicators of talented behavior, considered in this phase of the research. Corresponding values for R^2 would represent the regression variance, or degree to which the indicators or dimensional variables account for the variation among students in the values of six measures of talented behavior in the junior high school.

Whichever way the entries may be interpreted, the coefficients all were highly significant and served as one kind of evidence for the validity of the selected dimensional variables as predictors of talented behavior. In addition, the coefficients indicated that only a small proportion of the predictive value of the indicators was lost when data were combined for school locations and for boys and girls. When multi-factor variables such as CTMM Mental Function, STEP Listening, DAT Mechanical Reasoning, and Rhymes were removed from the set of predictors, there was some loss of efficiency in the explanation of CAT Reading, STEP Social Studies, STEP Science, and (for the total population)CAT Arithmetic. Nevertheless, there was a corresponding gain in the specificity of the cognitive factors.

Factor Analyses of Indicator Variables

The method of factor analysis was chosen to determine whether or not the indicators, of dimensional variables, combined to form factors which corresponded to the categories specified in the general proposition derived from the model for research in human talent. Three analyses were carried out with 32 potential indicators retained throughout the multiple regression studies. One of these factor-analytic studies was for boys, one for girls, and the third for the total population.

To obtain the factor structures, the intercorrelations of the 32 dimensional variables were calculated for each population and centroid factors (Fruchter, 1954, pp. 59-85) were extracted by means of programs for the IBM 650 computer. Then this same equipment was programmed for the rotation of the centroid factors to an orthogonal normal varimax solution (Kaiser, 1958). The varimax criterion for analytic rotation was chosen since it had the greater likelihood of portraying factors invariant under changing samples of tests or other measures with different populations.

Table G-8 was constructed to summarize the orthogonal loadings for the seven factors extracted, together with the communalities of the variables, from the intercorrelation matrix for the total seventh-grade population. Similar tables were obtained for girls and for boys but, to conserve space, they have been placed in the Supplementary Appendixes and only the factor loadings are shown in the section which follows. In the three factor analyses, five factors were matched and shown to be relatively invariant with changes in the composition of the population. Two other factors were specific for boys and two were specific for girls.

Identification of the Factors

The five factors found in the congruent factor space of the three analyses were listed in Table G-9 in the order of their correspondence to the categories of variables postulated in the model. Each list had factor loadings for total population, boys, and girls. Then the factors specific to boys and to girls were identified. The indicators, or dimensional variables, have been shown by number used in this appendix and by name in the lists. The highest loadings for each variable is indicated by an asterisk.

As shown in Table G-9, each of the factors extracted from the 32-variable matrices was identified by a letter and given a tentative name. The five factors "common" to boys and girls, Factors A through E, were matched for the two sexes (Cattell, 1957, pp. 818-827). Resemblance was determined by correlating the loading magnitudes of the 32 indicators of talented behavior for the factor in the matrix for boys with similar values for girls. This simply involved the correlation of the 32 entries in two vertical columns, one from each rotated matrix, each designated by a Roman numeral to identify the order in which the factor had been extracted. When the Pearson product moment correlation coefficients, r_{mf}, were greater than .70, the correlations not only were significant (Snedecor, 1956, p. 174) but also the paired factors for males and females were regarded as having more than 50 per cent common variance. Two factors, F and G, remained specific to the 634 boys; and two others, H and I, were specific to the 608 girls. These were entered, together with loadings defining each factor after the common factors in Table G-9.

Weights of Indicators in the Factors

The factor analyses led to a hypothesis that the 32 indicators of talented behavior among junior high school students might be represented by a smaller number of factor variables. In Table G-9, nine factor variables were proposed, five common to both sexes, two specific to boys, and two specific to girls. Two other factors were considered in the factor study for the total population; namely, Factor J, Practical-Minded Toughness (IV in Table G-8), and Factor K, Anxious Resentment (VI in Table G-8). Except for some exploratory studies in Appendix H, these potential factors were given little consideration since they were not common to both sexes.

The assumption behind the hypothesis was that the interpreted factors were unities or variables by which individuals could be assessed for talented behavior just as meaningfully and more economically than by a fluctuating selection of tests for the two sexes and different school locations. One problem remained. Were some of the indicator variables with loadings shown for a factor in Table G-9 actually linear combinations of other variables in the same set? The problem was to determine the unique contribution of each indicator variable to a factor variable.

Table G-10 was derived from a series of multiple regression analyses to provide answers to the problem. For example, to obtain the values entered in column A of the table, the following procedure was employed. A (k + 1) intercorrelation matrix was constructed with unities entered in the diagonal. The entries were the intercorrelations of the set of 12 indicator, or dimensional variables, and the validity coefficients in the last column. These validity coefficients were the 12 factor loadings of the indicator variables upon Factor A, Cognitive Approach, for the total population. Again the iterative technique (Bottenberg, 1960; Greenberger & Ward, 1956)was used to obtain a set of regression weights shown in column A. This procedure maximized the multiple correlation, R = .88, of the set of 12 indicators with the potential factor variables. Similar procedures were used for each of the other factors as summarized in the table.

The factor variables derived as a result of the operations described in this appendix apparently fitted the model for research in human talent and thus supported the general proposition stated earlier. Two of them, Factor A, Cognitive Approach, and Factor B, Divergent Thinking,clearly were underlying elements of cognitive and perceptual abilities measured by the indicator variables. Factor C, Socially-Oriented Achievement Motivation, was concerned with expectations about one's own behavior and the probable supportive or nonsupportive responses of others to one's actions. Boys and girls high on this factor variable would represent themselves as being acceptant of school and cultural standards, motivated toward academic achievement, stable, somewhat restrained, positive toward teachers and people in general, and not overly anxious. Factor D, Peer Stimulus Value, and Factor E, Absence of Negative Valuations, apparently reflected affiliative and distance aspects of assessments boys and girls made of one another. Consequently, they could be regarded as indices of each boy's and girl's responses to socialization pressures imposed directly by age-mates and, indirectly, by parents, teachers,and other adults.

Also supporting the proposition and model, two factors were specific for boys and two for girls. Factor F (Boys), Anxious Emotionality, and Factor H (Girls), Sensitive Dependency, described sex-typed elements of personality. Factor G (Boys) Anti-Social Wariness, combined attitudinal and perceptual measures. Finally, Factor I (Girls), Perceptual-Motor Skills, though ill-defined, represented perceptual and psychomotor abilities.

Table G-1

Regressions of GPA Teacher Evaluations for Grade VII Upon Selected Dimensional Variables by Community and Sex Role

(Decimal points omitted)

Dimensional Variable*	Community							
	A		B		C		D	
	M	F	M	F	M	F	M	F
Regression of GPAs, R^2	72	59	72	70	64	68	65	71
Multiple correlation, R	85	77	85	84	80	82	81	84
Sample population, N	161	157	94	112	266	241	113	98
1. CTMM Mental Function			19	10	18	13	35	10
3. DAT Mech. Reasoning			-06		-10		04	
4. Gestalt Transform'n	04		14	08	03	13	17	07
5. Rhymes	26	08	06	06	11	10	03	23
6. Unusual Uses			05	17		09	03	-25
7. Consequences			-15	-06	-03	05	-13	-10
8. Common Situations		-11	-03	-04	17		06	06
9. Seeing Problems	08	13	17	16		15	11	18
10. Mutilated Words	-03	08	-06	15	10	09	04	12
11. Gestalt Completion	-11	-09	10	12	-06	03		
12. Short Words	11	17	17	07	06	10	-06	-16
13. Dotting	-10	05	-10		07	-03	04	16
14. DRT	09			-04	07	-05		16
15. JPQ 1 Sensitivity			02	03	-03		10	-08
16. JPQ 3 Emotionality	-11		-10			-03	-10	06
17. JPQ 6 Cyclothymia	04			03	-06	07	-08	-06
18. JPQ 8 Soc. Morale	-05		-08			-02	14	-11
19. JPQ 9 Dominance	10	-06	06	-06		03	15	-16
20. JPQ 11 Surgency		-10	07	-15		03	05	10
21. SSHA Schol. Motiv'n	10	23		12	20	12	14	26
22. CMAS Anxiety	-06		-19		04			-10
23. CYS Authoritarian			11	-20	-04		03	-13
24. CYS Critic. Youth	06	-09	13	11			-04	
25. CYS Critic. Education	-11		-07	03	02		07	-15
26. CYS Neg. Orientation		07			-07		-03	
27. CYS Maladjustment		-09					-11	18
30. ISS Family Status			12	-08	-04	-04	04	18
31. N-1 Peer Acceptance	29	23	06	09	28	23	24	39
32. N-2 Model Value	17	07	-08	07	19	07		16
33. N-3 Soc. Effectiveness	19	20	18	19	20	14	13	-04
34. N-4 Nondeviant	05	15	20	07	08	05	12	
35. N-5 Quiet Dependency	09	-02	04		14	05	10	

*Beta weights with zero values have been left blank.

Table G-2

Regressions of CAT Arithmetic Achievement in Grade VII Upon Selected Dimensional Variables by Community and Sex Role

(Decimal points omitted)

Dimensional Variable*	Community A M	A F	B M	B F	C M	C F	D M	D F
Regression variance, R^2	61	59	67	60	61	65	62	61
Multiple correlation, R	78	77	82	77	78	81	79	78
Sample population, N	161	157	94	112	266	241	113	98
1. CTMM Mental Function	21	22	36	15	21	19	40	17
3. DAT Mech. Reasoning	15	12	22	11	08	09	-03	03
4. Gestalt Transform'n	04	03	-14	10	10	06	13	17
5. Rhymes	04	16	25	17	25	25	-07	28
6. Unusual Uses			06	05	-05	05		-15
7. Consequences	04	14		-16		08	-17	
8. Common Situations	06			13	-04	-10	13	-12
9. Seeing Problems	13	04	-03		04	10	14	15
10. Mutilated Words	05	11		32	05	07		
11. Gestalt Completion		-09	08	-04			-07	13
12. Short Words	11	03	28		13	11	14	03
13. Dotting			-19				-21	
14. DRT	09	-03	-04		11	07	09	21
15. JPQ 1 Sensitivity			-19	-13	-02	05	04	15
16. JPQ 3 Emotionality	-04		-12	-26			-04	
17. JPQ 6 Cyclothymia	12	03	-19	-05		02	-04	-03
18. JPQ 8 Soc. Morale	-13	-04	-02		-04	-02	13	10
19. JPQ 9 Dominance	03	-04	06	-05			05	
20. JPQ 11 Surgency		03	-05		-03	06	-10	10
21. SSHA Schol. Motiv'n	03	05	13	13	08	09	17	
22. CMAS Anxiety	04	10	-09		03		06	-16
23. CYS Authoritarian	06	02	14	-10			-09	-14
24. CYS Critic. Youth		-03		-04	-07			20
25. CYS Critic. Education	-13	-03	-10				19	-27
26. CYS Neg. Orientation		-10		13	-03		03	06
27. CYS Maladjustment		-14		08	06		-04	
30. ISS Family Status	-04		03				03	-17
31. N-1 Peer Acceptance	05		-09	04	15	12	20	07
32. N-2 Model Value	13		-19		12	03	07	23
33. N-3 Effectiveness	08	26	08	-13	08	04	10	-16
34. N-4 Nondeviant	03	15	39	10	11	13	03	03
35. N-5 Quiet Dependency	07	-03	-04		09	06	-06	-06

*Beta weights with zero values have been left blank.

Table G-3

Regression of Measures of Educational Achievement and STEP Listening upon Selected Dimensional Variables for Grade VII Boys, N = 634
(Decimal points omitted)

Dimensional Variables*	Criterion Variables						
	36 GPA Year	37 CAT Read	38 CAT Lang	39 CAT Arith	40 STEP So.St.	41 STEP Science	2 STEP List
Regression variance, R^2	57	61	57	51	58	57	55
Multiple correlation, R	75	78	75	71	76	75	74
1. CTMM Mental Function	15	34	32	25	23	17	**
3. DAT Mech. Reasoning	-03	10	09	12	16	22	**
4. Gestalt Transform'n	08	14	06	08	14	20	21
5. Rhymes	10	20	19	13	13	07	**
6. Unusual Uses	04				08	08	18
7. Consequences	-04				03	08	10
8. Common Situations	10		-05	-04	-04	-05	-05
9. Seeing Problems	04	05	05	04	10	06	05
10. Mutilated Words	06		16	06			-07
11. Gestalt Completion	-05						18
12. Short Words		09	12	10	03	04	05
13. Dotting		-03		-04	-07	-05	
14. DRT	04		04	12	06		09
15. JPQ 1 Sensitivity		-03					
16. JPQ 3 Emotionality	-05			-06	-04	-03	-06
17. JPQ 6 Cyclothymia		03			03	03	03
18. JPQ 8 Soc. Morale							-09
19. JPQ 9 Dominance	05		03	04	03		
20. JPQ 11 Surgency		-03		-05		-06	
21. SSHA Schol. Motiv'n	15	12		04	11	11	14
22. CMAS Anxiety				03	06	04	09
23. CYS Authoritarian						-04	-13
25. CYS Critic. Education			-08				-05
26. CYS Neg. Orientation	-05		-04		-03		-09
27. CYS Maladjustment		03				02	
30. ISS Family Status		05			07	06	16
31. N-1 Peer Acceptance	25	03	03	09		06	-02
32. N-2 Model Value	13			07		02	
33. N-3 Effectiveness	21	05		04	09	09	12
34. N-4 Nondeviant	09	04	09	12	07	10	05
35. N-5 Quiet Dependency	08	04		03	03	08	-03

*Beta weights with zero values have been left blank.

**Variable omitted in the computation of beta weights on IBM 650.

Table G-4

Regression of Measures of Educational Achievement and STEP Listening upon Selected Dimensional Variables for Grade VII Girls, N = 608 (Decimal points omitted)

Dimensional Variables*	Criterion Variables						
	36 GPA Year	37 CAT Read	38 CAT Lang	39 CAT Arith	40 STEP So. St.	41 STEP Science	2 STEP List
Regression variance, R^2	56	65	60	52	65	60	56
Multiple correlation, R	75	81	77	72	81	77	75
1. CTMM Mental Function	05	30	23	20	27	16	**
3. DAT Mech. Reasoning		08	03	10	11	13	**
4. Gestalt Transform'n	11	10	04	07	12	16	19
5. Rhymes	13	17	23	23	19	11	**
6. Unusual Uses	07	06	06		05	12	20
7. Consequences		09	06	04		06	09
8. Common Situations	-05	-03	-08	-05	-04	-11	-04
9. Seeing Problems	16	03		03	07	11	13
10. Mutilated Words	12	08	17	13	03	03	-03
11. Gestalt Completion	-04				09		08
12. Short Words	03	03	11	08			05
13. Dotting			07		-03		-05
14. DRT		06		05	06	13	09
15. JPQ 1 Sensitivity					03	-02	
16. JPQ 3 Emotionality		-04		-03	-04	-05	-03
17. JPQ 6 Cyclothymia	05			04		06	03
18. JPQ 8 Soc. Morale			-03	-02	-07	-04	-06
19. JPQ 9 Dominance			-03	-09	-04		
20. JPQ 11 Surgency		05	06	06	03		03
21. SSHA Schol. Motiv'n	20	10	11	10	07	10	09
22. CMAS Anxiety		07	05		04	10	04
23. CYS Authoritarian	-06				-04	-06	-10
25. CYS Critic. Education		-03			-04	-06	-05
26. CYS Neg. Orientation		-09	-08		-07	-09	-11
27. CYS Maladjustment		02			05	04	
30. ISS Family Status		-05	04	-03	04	03	14
31. N-1 Peer Acceptance	24	03	08	09	05	11	05
32. N-2 Model Value	09	03	05	06	03	04	
33. N-3 Effectiveness	13	06	03		09	03	03
34. N-4 Nondeviant	07	05		12	07		05
35. N-5 Quiet Dependency	05		03	03	04	05	04

*Beta weights with zero values have been left blank.

**Variable omitted in the computation of beta weights by IBM 650.

Table G-5

Regressions of Measures of Educational Achievement and Mental Function upon Selected Dimensional Variables for Grade VII Population, N = 1242 (Decimal points omitted)

Dimensional Variables*		Criterion Variables					
	36 GPA Year	37 CAT Read	38 CAT Lang	39 CAT Arith	40 STEP So.St.	41 STEP Science	1 CTMM IQ
Regression variance, R^2	56	61	56	49	64	63	48
Multiple correlation, R	75	78	75	70	80	80	69
2. STEP Listening	17	33	20	19	42	42	21
3. DAT Mech. Reasoning	-04	10	-05	10	12	16	17
4. Gestalt Transform'n	05	10	06	08	11	15	09
5. Rhymes	13	21	26	22	15	06	17
6. Unusual Uses	04				03	05	
7. Consequences			03			03	05
8. Common Situations			-07	-03	-02	-04	
9. Seeing Problems	08	04	05	03	06	05	
10. Mutilated Words	15	10	19	13	08	06	08
11. Gestalt Completion	-06			-03		-03	
12. Short Words		07	11	09			06
13. Dotting	03		04		-03	-04	
14. DRT				07	04	04	05
15. JPQ 1 Sensitivity			04		03		
16. JPQ 3 Emotionality	-04	02		-07	-04	-03	-04
17. JPQ 6 Cyclothymia						04	
18. JPQ 8 Soc. Morale							
19. JPQ 9 Dominance							03
20. JPQ 11 Surgency	03		07		02	-03	
21. SSHA Schol. Motiv'n	15	08	03	04	03	06	
22. CMAS Anxiety						04	
23. CYS Authoritarian			03				
25. CYS Critic. Education			-04			-03	
26. CYS Neg. Orientation	-03	-03	-07				
27. CYS Maladjustment		03			04	03	
30. ISS Family Status		-07			-06	-03	15
31. N-1 Peer Acceptance	23	03	04	10	06	07	
32. N-2 Model Value	11			07	04	03	03
33. N-3 Effectiveness	16	06	07		04	04	03
34. N-4 Nondeviant	07	04	07	12	06	05	02
35. N-5 Quiet Dependency	08	04	04	05	05	07	

*Beta weights with zero values have been left blank.

Table G-6

Regressions of Teacher Evaluations and Grade VII Achievement Upon Selected Dimensional Variables for Grade VII Population, N = 1242
(Decimal points omitted)

Dimensional Variables*	Criterion Variables					
	36 GPA Year	37 CAT Read	38 CAT Lang	39 CAT Arith	40 STEP So. St.	41 STEP Science
Regression variance, R^2	55	52	50	43	53	52
Multiple correlation, R	74	72	71	63	72	72
4. Gestalt Transform'n	13	23	13	15	22	26
6. Unusual Uses	08	13	12	13	18	17
7. Consequences		06	08	04	05	07
8. Common Situations		-04	-10	-05	-05	-10
9. Seeing Problems	12	10	11	08	14	14
10. Mutilated Words	15	10	24	16	05	03
11. Gestalt completion	004	04			06	04
12. Short Words	05	14	17	13	10	06
13. Dotting			05		-05	-03
14. DRT		06	03	09	08	09
15. JPQ 1 Sensitivity	02					-04
16. JPQ 3 Emotionality	-04	-04		-06	-06	-04
17. JPQ 6 Cyclothymia		02		03	03	04
18. JPQ 8 Soc. Morale		-04		-04	-07	-05
19. JPQ 9 Dominance	03	02				
20. JPQ 11 Surgency	05		07			-05
21. SSHA Schol. Motiv'n	19	11	05	08	09	10
22. CMAS Anxiety		04	04		08	08
23. CYS Authoritarian	-02	-03		-03	-05	-06
25. CYS Critic. Education		-04	-07	-03	-05	-06
26. CYS Neg. Orientation	-06	-08	-09		-07	-05
27. CYS Maladjustment						
30. ISS Family Status		12	-08	-06	12	11
31. N-1 Peer Acceptance	25	04	07	10	05	05
32. N-2 Model Value	11			06	03	03
33. N-3 Effectiveness	18	07	06	03	07	09
34. N-4 Nondeviant	08	07	09	13	08	08
35. N-5 Quiet Dependency	08	03	06	04	04	06

*Beta weights with zero values have been left blank.

Table G-7

Multiple Correlation Coefficients for Criterion Measures
(Decimal points omitted)

Regression Analysis*		Criterion Measures					
		36 GPA Year	37 CAT Read	38 CAT Lang	39 CAT Arith	40 STEP So.St.	41 STEP Science
Sherman	Males	85	82	81	78	80	79
	Females	77	84	82	77	84	77
Corsicana	Males	85	83	82	82	84	85
	Females	84	84	84	77	82	78
Port Lavaca	Males	81	81	75	79	79	77
	Females	84	83	81	78	85	81
Victoria	Males	80	81	81	78	79	79
	Females	82	85	83	81	86	85
All Males (N = 634)	A	75	78	75	71	76	75
	B	75	78	73	70	80	79
	C	74	71**	68	66	71**	71**
All Females (N = 608)	A	75	81	77	72	81	77
	B	75	81	77	72	82	82
	C	74	75**	73	67	76**	75**
Total Population (N = 1242)	A	74	78	75	69	77	73
	B	75	78	75	70	80	80
	C	74	72**	71	63**	72**	72**

*Each coefficient represents a separate regression analysis illustrated in the preceding tables. The three types of combined analyses are:

A. CTMM Mental Function included, STEP Listening omitted;
B. STEP Listening included, CTMM Mental Function omitted;
C. Multi-factor cognitive tests omitted--CTMM Mental Function, STEP Listening, DAT Mechanical Reasoning, and Rhymes.

**Multiple correlation coefficient significantly different at the .01 level of confidence from the largest coefficient for the same criterion measure and population with a different set of predictors, based upon F-test (3).

Table G-8

Orthogonal Factor Loadings and Communalities of 32 Dimensional Variables for Total Population, N = 1242 (Decimal points omitted)

Variables		Factors*							
		I	II	III	IV	V	VI	VII	h^2
1.	CTMM Mental Function	69	12	10	02	-03	-08	-17	53
2.	STEP Listening	73	19	08	03	00	-16	-18	64
3.	DAT Mech. Reasoning	59	-01	00	36	-06	-01	-06	49
4.	Gestalt Transform'n	60	06	01	12	-03	02	-03	38
5.	Rhymes	59	11	11	-11	00	-08	-34	50
6.	Unusual Uses	57	10	06	09	00	00	-36	48
7.	Consequences	29	11	07	04	03	01	-61	48
8.	Common Situations	22	09	16	00	-01	-05	-60	45
9.	Seeing Problems	38	12	07	-05	-04	-08	-61	55
10.	Mutilated Words	35	02	22	-34	-17	-06	-32	42
11.	Gestalt Completion	47	-02	13	-07	-15	-14	-25	35
12.	Short Words	31	04	21	-31	-12	-04	-25	32
13.	Dotting	29	09	24	-17	-20	-04	-16	25
14.	DRT	41	03	21	-04	-14	-06	-10	25
15.	JPQ 1 Sensitivity	-14	17	-10	-56	-05	06	04	38
16.	JPQ 3 Emotionality	-12	-60	-14	-15	-06	11	11	45
17.	JPQ 6 Cyclothymia	08	39	02	-08	01	03	-08	18
18.	JPQ 8 Soc. Morale	-08	66	-07	-31	-07	15	-05	57
19.	JPQ 9 Dominance	14	-52	00	22	08	13	05	36
20.	JPQ 11 Surgency	-03	-21	10	19	12	-29	-07	20
21.	SSHA Schol. Motiv'n	24	60	11	03	-13	06	-07	46
22	CMAS Anxiety	-09	-52	-13	-27	06	46	03	59
23.	CYS Authoritarian	-16	-02	-01	-05	-04	46	04	25
25.	CYS Critic. Education	-16	-51	-04	01	00	09	02	29
26.	CYS Neg. Orientation	-24	-37	03	03	-03	49	-01	44
27.	CYS Maladjustment	-01	-39	-12	-24	24	27	06	36
30.	ISS Family Status	45	13	08	-01	10	-13	-10	26
31.	N-1 Peer Acceptance	24	20	72	-05	10	02	-09	64
32.	N-2 Model Value	03	12	-07	-01	-63	00	01	42
33.	N-3 Effectiveness	24	19	59	-11	17	-05	-09	50
34.	N-4 Nondeviant	10	06	-06	-06	-59	09	-03	37
35.	N-5 Quiet Dependency	-03	07	-45	-15	01	05	10	24

*Centroid factors with varimax rotation to .05 by IBM 650

Table G-9

Factor Structure and Loadings of Variables Indicating Talented Behavior

Variable	Population		
	Total	Boys	Girls
Factor A. Cognitive Approach (CA), r_{mf} = .92			
	I	I	I
2. STEP Listening (apprehension)	.73*	.69*	.75*
1. CTMM Mental Function (I.Q.)	.69*	.70*	.66*
4. Gestalt Transformation (redefinition)	.60*	.60*	.59*
3. DAT Mechanical Reasoning (figural)	.59*	.62*	.57*
5. Rhymes (word fluency, verbal facility)	.59*	.62*	.57*
6. Unusual Uses (flexibility)	.57*	.59*	.59*
11. Gestalt Completion (recognition)	.47*	.35	.42*
30. ISS Family Status (experiences)	.45*	.41*	.46*
14. DRT Discrimination Reaction	.41*	.25	.38
9. Seeing Problems (sensitivity)	.38	.36	.36
10. Mutilated Words (symbolic closure)	.35*	.28	.27
12. Short Words (speed of closure)	.31	.30	.23
Factor B. Divergent Thinking (DT), r_{mf} = .75			
	VII	IV	VI
9. Seeing Problems (sensitivity)	.61*	.62*	.59*
7. Consequences (conceptual foresight)	.61*	.59*	.53*
8. Common Situations (ideational fluency)	.60*	.63*	.58*
6. Unusual Uses (flexibility)	.36	.37	.31
5. Rhymes (word fluency, verbal facility)	.34	.31	.38
10. Mutilated Words (symbolic closure)	.32	.40*	.39*

(continued)

Table G-9 (continued)

Variable	Population		
	Total	Boys	Girls
Factor F (Boys). Anxious Emotionality (AE)			
		II	
22. CMAS Anxiety ("to avoid failure")		.68*	
27. CYS Personal Maladjustment		.57*	
16. JPQ 3: Emotionality vs. Stability		.43*	
15. JPQ 1: Sensitivity vs. Toughness		.33*	
Factor G (Boys). Anti-Social Wariness (AW)			
		VII	
26. CYS Negative Social Orientation		.51*	
25. CYS Criticism of Education		.31	
23. CYS Authoritarian Discipline		.30*	
12. Short Words (speed of closure)		.31*	
10. Mutilated Words (symbolic closure)		.30	
Factor H (Girls). Sensitive Dependency (SD)			
			IV
15. JPQ 1: Sensitivity vs. Toughness			.45*
23. CYS Authoritarian Discipline			.43*
18. JPQ 8: Socialized Morale vs. Dislike of Education			.40
20. JPQ 11: Surgency vs. Desurgency			-.35*
Factor I (Girls). Perceptual-Motor Skills (PM)			
			VII
11. Gestalt Completion (visual figural recognition)			.39
13. Dotting (psychomotor speed, finger and wrist dexterity)			.31
14. DRT Discrimination Reaction Time			.28

TABLE G-10

Regression Weights for Derived Factor Variables
(Decimal points omitted)

Dimensional Variables*	Common Factors					Boys		Girls	
	A	B	C	D	E	F	G	H	I
1. CTMM Mental Function	21*								
2. STEP Listening	28*								
3. DAT Mech. Reasoning	18*								
4. Gestalt Transform'n	19*								
5. Rhymes	11*	-02							
6. Unusual Uses	09*	01							
7. Consequences		32*							
8. Common Situations		27*							
9. Seeing Problems	-03	32*							
10. Mutilated Words	03	04					22*		
11. Gestalt Completion	09*								25*
12. Short Words	01						21*		
13. Dotting									16*
14. DRT	08*								11*
15. JPQ 1 Sensitivity						20*		33*	
16. JPQ 3 Emotionality			-19*			12*			
17. JPQ 6 Cyclothymia			11*						
18. JPQ 8 Soc. Morale			32*					26*	
19. JPQ 9 Dominance			-16*						
20. JPQ 11 Surgency								-15*	
21. SSHA Schol. Motiv'n			21*						
22. CMAS Anxiety			-13*			45*			
23. CYS Authoritarian							18*	34*	
25. CYS Critic. Educ'n			-16*				16*		
26. CYS Neg. Orientation			-04				42*		-19*
27. CYS Maladjustment			-07			29*			
30. ISS Family Status	09*								
31. N-1 Peer Acceptance				50*					
32. N-2 Model Value					44*				
33. N-3 Effectiveness				25*					
34. N-4 Nondeviant					37*				
35. N-5 Quiet Dependency				-23*					
Regression on factor, R^2	78	56	77	61	54	59	45	45	23
Multiple correlation, R	88	75	88	78	73	77	67	67	48

*Dimensional variable selected for estimation of factor score.

APPENDIX H

FACTOR VARIABLES AND TALENTED BEHAVIOR

At this stage of the Human Talent Project, the research team had succeeded in testing and reducing some 140 potential measures and indices of talented behavior to a much smaller number of variables. Distributions of transformed scores for 46 nomination items were mapped by five sociometric factor variables common to boys and girls and five specific to each sex role (Appendix F). Relationships among the other kinds of measures were explored by factor-analytic and variance techniques (Appendix E). Clearly, there were variations in performances and observed behaviors due to differences in sex role, levels of mental function, age-mate acceptance and avoidance, family background, and school location in the four communities. Then, in Appendix G, the focus turned to 32 variables (including the five sociometric factor scores common to both sexes) which showed the most promise as indicators, or measurable dimensions, of talented behavior in the junior high school years.

The analyses of the 32 selected indicators of talented behavior served to demonstrate the general propostion that variations in valued kinds of performances among junior high school students could be explained, i large part, by three categories of information about boys and girls in the four school locations. Sets of variables from the 32 indicators combined in various ways to explain a significantly high proportion of differences in teacher evaluations and measures of achievement in the seventh-grade year. Further analyses of the 32 indicators, or dimensional variables, led to the hypothesis that observed differences in talented behavior among junior high school boys and girls could be explained and predicted by an even smaller number of factor variables. This appendix reports a series of studies to test that hypothesis.

Estimation of Factors in Persons

The objective was to assess, explain, and predict differences in various kinds of talented behavior among students in junior high schools in the most meaningful and yet economical ways. In other words, the problem was to derive and validate a limited set of factor variables which would do the work of a much larger number of tests and other measures in a more stable manner. Potential factor variables had been identified in the analyses reported in Appendix G. The next step was to determine a way of estimating the endowment of an individual on a factor. After studying a number of procedures for accomplishing this end (Cattell, 1957, pp. 287-296; Fruchter, 1954, pp. 204-205; Guilford, 1954, pp. 534-536; Guilford & Michael, 1948; Trites & Sells, 1952), the multiple regression method was chosen to obtain a true weighting of the indicators salient to each factor variable. Then, using the weights obtained for each indicator, a factor scores could be computed for each person on each of the new measures.

Table H-1 was constructed to show the optimal weights of the indicators, of dimensional variables, for each factor variable postulated to have a bearing upon talented behavior. The potential indicators for each factor variable had been identified in Table G-9 of the preceding appendix. Then, for each factor variable, the regression weights of the indicators were computed and entered in Table G-10. In that table, indicators selected for the estimation of factor scores were denoted by an asterisk. With a cut-off point at a beta weight of .08, each indicator was represented in only one of the composites for the five factors common to boys and girls. Only four of the indicators (JPQ 3, JPQ 8, CMAS Anxiety, CYS Criticism of Education) were used to estimate scores for persons on both a common factor and one of the new measures for either boys or girls. This reduced the possibility of spurious correlations among the derived composite variables to the minimum practical in the situation.

The optimal weights shown in Table H-1 were obtained by the iterative procedure (Greenberger & Ward, 1956) described earlier. For example, to compute the optimal weights for Factor A, Cognitive Approach, the nine indicator variables shown in the table were chosen. Then a 10 x 10 intercorrelation matrix was constructed, with unities entered in the diagonals. Factor loadings of the indicators, shown in table, were placed in the last column as validity coefficients. Regression analysis produced the optimal weights set forth in the table, with $R^2 = .7663$ as the sum of squares due to regression. The multiple correlation coefficient, $R = .88$, when rounded, was the same as that obtained for a larger set of indicators (see Table G-10). A similar procedure was followed to compute the optimal weights of indicators for each of the remaining factor variables. Using formula (2) in Appendix G, F-tests were employed to determine whether or not the optimal weights represented the factor variable as efficiently as the total set of indicators identified in the preceding study. In no case were the multiple correlations obtained for the optimal weights significantly different from the ones shown at the base of Table G-10.

Two additional factor variables were developed for Table H-1. They were derived from Factor IV and Factor VI for the total population as shown in Table G-8 of the preceding appendix. Factor J, Practical-Minded Toughness, combined attitudinal and cognitive attributes. Factor K, named Anxious-Dependent Resentment, appeared to represent an attitudinal and behavioral pattern, unevenly distributed among boys and girls, which warranted further exploration.

The next step was to estimate the factor scores and compute stanine values for each boy and girl on each of the five "common" factor variables, the two "specific" to each sex, and the two "provisional" ones identified in the total population. This step was facilitated by writing suitable programs for the IBM 650 equipment. Thus each individual who had a score for each of the necessary indicator variables was assigned a new set of stanine values to estimate his or her endowment on the factor variables (Cattell, 1957, pp. 287-296; Guilford, 1954, pp. 534-536).

Explanatory Value of the Factor Variables

Table H-2 was constructed to determine whether or not the new factor variables served to explain some of the variations between boys and girls and among communities in the kinds of academic performances valued in junior high schools. The last three columns provided modal patterns for boys (M), girls (F), and the total population. In addition, the table permitted a comparison between the factor variables and sets of indicators as predictors of six measures of educational attainment in the seventh grade. For this purpose, multiple correlation coefficients and other statistics for the regression of criterion measures on the indicators described in Appendix G also were included in the table.

The population selected for study, 329 boys and 348 girls, 677 in all, comprised slightly more than half of the total population upon whom data had been obtained in the seventh grade. As indicated by the enumeration data in Appendix A, a rather large change in the composition of the school population of the four communities took place from year to year. Movements of families to other communities and the small number dropping out of school, however, did not account for all of the shrinkage in numbers of boys and girls. To qualify for the study, other criteria had to be met. The subjects were students who had continued to grade VIII and who had scores for all instruments yielding the necessary stanine values for the indicators weighted in the new factor variables. Furthermore, the same population was to be used to determine the degree to which the grade VII factor variables explained various kinds of age-mate appraisale (Table H-3) and the several types of academic performances in grade VIII (Table H-4). Thus the number in the "test population" was reduced drastically. When "make-up" tests had been administered, a larger population (N = 730 from grades seven to nine) was available to evaluate the extent to which the factor variables derived in grade VII predicted criterion measures of talented behavior in grade IX (Table H-5) at the close of the project.

School Grades Assigned by Teachers

The columns for each community in the section of Table H-2 headed GPA Teacher Evaluation (Grade VII) were designed to facilitate comparisons among school locations, between the sexes, and with modal patterns of regression upon the factor variables. For instance, the regression weights for boys (M) in community B clearly differed from the modal pattern and those in other school locations. The only similarity to other columns was the positive weight attached to attributes which peers appraise in Peer Stimulus Value. Negative values for Divergent Thinking and Socially-Oriented Achievement Motivation, as well as Anxious Emotionality, also occurred for most of the component indicator variables in Table G-1 in an earlier analysis. Boys of potentially high ability, as portrayed by Cognitive Approach, and regarded highly by age-mates apparently were penalized by teachers if they thought differently, reacted negatively to the school and its expectations, and appeared too stable and tough-minded. The emphasis upon cognitive variables in teacher evaluations of the school work of both boys and girls was not unexpected in the light of the factor.

structure of 50 variables derived for community B in Table E-4. In the other school locations, equal or greater importance was attached to non-cognitive attributes in the allocation of marks for school work. Thus the table permitted comparisons across columns and with data in other tables for boys and girls in each community.

Tests of significant differences between coefficients for the same criterion measure were based upon obtained deviations from regressions with appropriate degrees of freedom as described (3) in Appendix G. Results were summarized at the base of Table H-2. In every case but two, the multiple correlation between GPA Teacher Evaluation and sets of indicators were significantly higher than for the factor variables in grade VII. Exceptions were regressions for girls in community C and boys in D. Thus the indicator variables (Table G-1) explained a higher proportion of the variance in school marks assigned by teachers than did the factor scores in most situations. Nevertheless, the factor variables also explained a significantly high portion of the differences in GPA Teacher Evaluations. They had the added value of showing the manner in which indicators combined to yield a smaller number of meaningful composite measures that could be more readily compared and evaluated.

Standard Tests of Academic Achievement

The remaining criterion measures for grade seven in Table H-2 were standard tests of academic achievement, each described in Appendix D. Again comparisons could be made across columns, with the regressions upon indicators in Appendix G, and in the light of factor structures set forth in Table E-4. In almost every instance, the abilities or aptitudes represented in Cognitive Approach had the highest beta weights. Exceptions in the case of CAT Arithmetic occurred for girls in community A and boys in D where attributes assessed by age-mates in Peer Stimulus Value equalled or exceeded weights for cognitive abilities. These same sub-populations also were different from the others in CAT Language. Performances of students upon all standard tests, especially CAT Language, was lowered by Practical-Minded Toughness which represented tough-mindedness and a preference for the practical rather than the symbolic, unevenly divided among the boys and girls. Thus the table facilitated comparisons and inferences.

By and large, the factor variables served to explain performances on the two STEP test, Social Studies, and Science, almost as well as the sets of indicators or dimensional variables. The major exceptions were in community A and, for social studies, both sexes in community B. In community A, boys who represented themselves as anxious, somewhat maladjusted, and sensitive, summarized as Anxious Emotionality, performed well on STEP Social Studies and Science. In the same community, girls high on the Perceptual-Motor Skills factor tended to perform poorly on the two STEP tests. Patterns of weights for STEP Social Studies of both sexes in community B were quite different from A and from the modal pattern. In summary, the tests of significance between multiple correlation coefficients for the regression of measures of achievement upon sets of indicators and upon factor variables revealed the greatest differences in community A and the fewest in D.

At this point, the research group went back to consider the alternative hypotheses stated in Appendix G (pp. 6-7). Table H-2 certainly supplied a good deal of evidence to support the proposition that valued kinds of academic performances were influenced by the sex-typing of socialization pressures and the influences of school location. On the other hand, there also was evidence to support the second possibility. Potential abilities, expectancies about one's own and others' behavior, and pressures of older persons and peers combined in various ways to explain each kind of academic performance valued in the junior high schools being studies. The alternative hypotheses had to be given further consideration. A decision was made to continue the exploratory study of factor variables since they showed a good deal of explanatory value and shed light on the two possibilities.

Age-Mate Appraisals and the Factor Variables

Meanwhile, attention was directed to the value of age-mate appraisals as potential criterion measures of talented behavior. This possibility was suggested in the description of variables (Appendix D, pp. 2-3). By the fall of 1958, when the experimental population was in the first semester of the eighth grade, stanine values for nine kinds of age-mate assessments were available. Nominations received by each boy and girl had been transformed (Mosteller & Bush, 1954; Snedecor, 1956, pp. 314-316) because they represented enumeration data and assumed a Poisson distribution. Thus the variance had to be stabilized by a modified square-root transformation, $X_t = \sqrt{X} + \sqrt{X + 1}$, before stanine values were computed for the age-mate appraisals of each student.

Table H-3 was constructed to summarize the regressions of the nine different kinds of age-mate appraisals of talented behavior upon the set of factor variables for boys, for girls, and for the "test population" described in the preceding section (Greenberger & Ward, 1956), multiple correlation coefficients were computed and entered at the base of the table. Again the composite table facilitated a number of comparisons.

Clearly,the characteristics attributed to age-mates in the composite factor, Peer Stimulus Value, played a large part in most of the peer appraisals. The composite represented peer acceptance (ones to be with, like to be like, work with), social effectiveness (enjoys everything, self confident, shows initiative), and low values of quiet dependency (quiet ones, left out, depends on parents and older people). As expected, the weight was very low for "nom Mechanical" among girls who apparently were not often regarded as having mechanical abilities.

The other factor variables varied in patterns of weights for the several peer appraisals of talents. Cognitive abilities appeared to be recognized in nominations for being artistic, creative, mechanical (boys), math ability (number), rhetorical (ability in dealing with words), and talented (girls). Divergent thinking was an attribute of boys appraised as being musical. High morale, scholastic motivation, stability, and other characteristics making up Socially-Oriented Achievement Motivation received appreciable weights in persons nominated for actor (both sexes), ability with numbers (boys), and being rhetorical (boys). Those named as creative often were valued negatively by their peers as were actors (boys, girls). Among boys, Anxious Emotionality most often characterized those nominated as musical or rhetorical and Antisocial Wariness (authoritarian outlook, negative attitudes, good closure on symbols) marked persons viewed as having mathematical abilities. Among girls, Sensitive Dependency was most lacking in those names as athletic and present for number. Taking boys and girls together, the indicators grouped in he composites Practical-Minded Toughness and Anxious-Dependent Resentment most frequently appeared in the ones nominated for mechanical abilities. Although stimulus value or recognition played a large part in the age-mate appraisals, other attributes of persons nominated apparently were given consideration in the assessments of one another.

Academic Talents in the Eighth Grade

The next question to be answered was whether or not the factor variables based upon indicators measured in the seventh grade would serve to explain the kinds of academic performances valued in the eighth grade. In addition, the research team wanted to find out the degree to which three abilities measured in grade VIII were associated with the composite factor scores derived in grade VII. Table H-4 was constructed to summarize the series of computations for boys, for girls, and for the "test population" previously described.

An examination of the multiple correlation coefficients in Table H-4 encouraged the further study of factor variables as explanatory and predictive measures of talented behavior. With few exceptions, the multiple regression of eighth-grade criterion measures upon sets of seventh-grade factor scores yielded higher multiple correlations than for the same criteria administered in the seventh grade. In general, the new coefficients were much closer to those obtained for the sets of indicators (taken from Table G-7). The major exceptions were for girls in CAT Reading, STEP Social Studies, and STEP Science. In each of these three instances, however, all three multiple correlation coefficients were not significantly different from one another and each accounted for more than 50 per cent of the variance on the criterion measure.

Regression analyses of the aptitude tests also yielded interesting information about them in terms of the factor variables. DAT Space Relations and DAT Abstract Reasoning were administered for the first time in grade VIII. STEP Listening was measured at the same time, using a different form than in grade VII. As expected, the abilities or aptitudes represented in Cognitive Approach accounted for a high proportion of the explained variation in performances on each of the tests. Apparently, scores on DAT Spatial Relations were suppressed by Divergent Thinking and enhanced by being a socially-motivated, stable, rather conforming individual. The surprising element in performances upon the DAT Abstract Reasoning test was their association with positive valuations from peers, the other weights not being unexpected. For STEP Listening, the positive values for Divergent Thinking were anticipated because Consequenses and Seeking Problems were components with appreciable weights in the analyses for grade VII (Tables G-3 and G-4).

By this time, a good deal of evidence had accumulated to convince the research team that the name of Factor I (Girls), Perceptual-Motor Skills, was in appropriate. The negative regression weights for the factor on DAT Abstract Reasoning and STEP Listening added to the cumulative evidence. Represented in the factor were perceptual closure or visual figural recognition (Gestalt Completion), a refusal to admit negative attitudes toward people (CYS Negative Social Orientation, loaded negatively), and perceptual-motor tests (Dotting, DRT). Taking the cumulative evidence into consideration, a decison was made tentatively to re-name Factor I (Girls), Perceptual Defenses.

Grade VII Factor Variables and Grade IX Criterion Measures

A crucial test of the explanatory and predictive values of the sets of factor variables remained to be undertaken. The necessary analyses had to wait until the final set of criterion measures for Grade IX was administered in the late spring of 1960 and scored during the early summer. Within the time limit, GPA Teacher Evaluations were completed for only two of the four communities, B and C. Distributions of scores were obtained, however, for all of the standard tests of academic achievement. As indicated in Appendixes B and D, new advanced forms of CAT Arithmetic, Reading, and Language were employed in grade IX. Likewise, STEP Social Studies and Science administered along with STEP Mathematics were new forms for use with high school students.

The hypothesis to be tested was that the factor variables would account for a significantly high proportion of the variations in performance upon the ninth-grade criterion measures. A corollary was thatthe multiple correlations would be reasonably similar or close to those obtained when sets of indicator variables were used to explain valued academic performances (Tables G-1 to G-8). Two underlying assumptions also were being examined. One was that the orthogonal normal varimax solutions employed in this research yielded factors which not only were psychologically meaningful but also were relatively invariant (Kaiser, 1958, 1960). The other assumption was that factor scores for persons "should be in the nature of a much more standard article" (Guilford, 1954, p. 524). If the hypothesis, its corollary, and the assumptions were to be demonstrated with some degree of confidence, the factor variables probably would be of value not only in explaining but also in the prediction of certain kinds of talented behavior.

Table H-5 was devised to summarize the long series of computations involving the regressions of ninth-grade criterion measures upon seventh-grade factor variables. The fifteen columns permitted entries for boys (M), for girls (F), and both together (Total) in each of the four communities as well as for the modal grade IX population. In addition to regression weights, rounded sums of squares due to regression (R^2) and multiple correlation coefficients (R) were entered in each column. To facilitate comparisons, multiple correlation coefficients obtained in previous analyses also were shown for each criterion measure.

Entries for population in the stubhead of Table H-5 dramatically illustrated the attrition rate from grade VII to grade IX. By the ninth grade, only 730 of the original 1,242 subjects studied in the seventh grade (Appendix G) remained in their original school locations and completed all of the criterion measures at the end of the school year. Of the 634 boys responding to necessary instruments in the first year of the Human Talen Project, only 366 were left at the close of the third year. Similarly, of the original 608 girls, only 364 finished the ninth grade and responded to the tests. Comparing these numbers with those in Table 3, 162 boys and 133 girls either had moved, left school, or not completed one or more of the necessary criterion measures during the final months of the ninth-grade year. As shown in Table A-4, however, they had been joined by a large number of newcomers to the four school locations. A majority of these newcomers responded to the criterion measures and to instruments necessary to compute new sets of scores for factor variables in grade IX. Thus, for any continuation of research into the senior high school years, a complete set of baseline data had been gathered for a majority of the boys and girls in the ninth grades of the four communities.

Teacher Evaluations

The necessary data to compute grade point averages of ninth-grade students in communities A and D could not be obtained in time for this report. Records in these school locations were not kept in a form which could be verifaxed, but persons were employed to make the transcriptions for later use. Only the records from community B in the north and C in the south were readily available by verifaxing the original documents.

Comparisons of similar entries for GPA Teacher Evaluations in Tables H-2 and H-5, by seventh-and ninth-grade teachers of communities B and C, revealed some similarities and some differences in weights attached to the factor variables. For example, in the seventh-grade elementary classrooms of community B, the individual teachers valued both cognitive abilities and attributes recognized by peers. They seemed to penalize boys with stable personalities who were capable of divergent thinking. On the other hand, the subject teachers in the ninth grades of the two junior high schools of community B appeared to put less emphasis upon cognitive aptitudes and valued boys with good study habits who complied with authority and avoided failure. Nevertheless, like the seventh-grade classroom teachers, the subject teachers in the ninth grade gave higher marks to boys regarded highly, or at least not valued negatively, by their age-mates. The patterns for girls over the junior high school years in community B were more alike than the weights for boys, the only difference being a reduction in emphasis upon cognitive qualities during the final year. In the two junior high schools of community C, departmentalized in both grades VII and IX, there were fewer differences in weights for the factor variables from 1957-58 to 1959-60. The major change was a reduction in the values attached to divergent thinking by the ninth-grade teachers when they evaluated school progress.

In the two school locations, B and C, the factor variables did not account for as high a proportion of the variance in GPA Teacher Evaluations in grade IX as they did in grade VII. Tests of significance (Appendix G, p. 4) showed that deviations from regression were significantly larger in the ninth than the seventh grades for both boys and girls. As illustrated in the preceding paragraph, the teachers in one year had somewhat different expectations from those in the other and there were variations according to sex role and school location. The inference was that school marks represented not only current performances in a subject area (Calhoun, 1956) but also expectations of teachers, which shift from grade to grade and differ among teachers in self-contained and departmentalized classrooms, as well as current abilities and attributes of the boys and girls being evaluated. Thus the hypothesis and the corollary did not appear to hold true for teacher evaluations, although the multiple correlation coefficients between criterion measures and the factor variables were significant.

Measures of Achievement (CAT)

The hypothesis and its corollary held true, with very few exceptions, when CAT Arithmetic, CAT Reading, and CAT Language administered in advanced forms were the criterion measures. Factor variables based upon values of indicators in the seventh grade accounted for a higher proportion of the variations in performances upon the ninth-grade criterion measures than they did in grade VII. Exceptions were boys in community D for CAT Arithmetic and boys again in community C on CAT Language. The corollary, that multiple correlations for grade IX criteria and grade VII factor scores would be reasonably similar or close to those obtained for indicator variables, also received considerable support. In six instances, the new multiple correlations were equal to or greater than those between indicators and similar criterion measures two years earlier. Thus the explanatory and predictive values of the factor variables for measures of talented performances of the CAT type for boys and girls in different communities appeared to be well established.

Comparisons of similar entries for the three CAT criterion measures in Tables H-2 and H-5 indicated that, for the most part, the measures combined in Cognitive Approach accounted for much of the variance in valued performances. Nevertheless, for boys and girls in each community, there were weights for the other factor variables which supplemented, modified, and suppressed the potentialities of cognitive abilities and aptitudes. For example, in the case of the lowered predictive value of factor scores for CAT Arithmetic among boys in community D, cognitive qualities had relatively low weights in both grades VII and IX. The major change was in Anxious Emotionality which had a positive weight in the seventh and a negative weight in the ninth grade. Apparently the boys in D who represented themselves as anxious, somewhat maladjusted, and sensitive could cope with the earlier form of CAT Arithmetic but not the advanced form. As illustrated, the cross-comparisons and possible inferences to be made from Table H-5 and previous ones concerned with similar sub-populations were almost endless.

Measures of Comprehension (STEP)

The explanatory and predictive values of the seventh-grade factor variables in relation to measures of comprehension and ability to draw conclusions provided by the STEP battery were not quite the same as for the standard tests of achievement exemplified in the CAT battery. For boys and girls in the four communities, the multiple correlations for grade IX were higher than those for grade VII in only four of sixteen instances. Combining boys and girls in each school location, however, four of eight coefficients were equal or larger in the later year. None of the coefficients were as large as those obtained for the indicator variables when they were studied in the seventh grade. Part of the explanation seemed to be that the forms of STEP Social Studies, Science, and Mathematics administered in grade IX (form 2A in each case) were designed for students in grades ten to twelve. Since the predictive value of the seventh-grade factor variables remained high, even upon such advanced criterion measures, the research team was surprised by and quite pleased with the regression values obtained in Table H-5.

By and large, the indicators combined in Cognitive Approach appeared to account for a major portion of the ability to comprehend and draw conclusions from the materials in the STEP instruments. This was true in the seventh (Table H-2) and the ninth grades (Table H-5). Nevertheless, there were differences according to sex role and school location in the manner in which cognitive qualities were modified by attributes, attitudes, expectations, and pressures imposed by peers. For example, boys and girls in communities B and C who were capable of less goal-bound Divergent Thinking performed effectively on STEP Social Studies, Mathematics, and Science, but this was not uniformly true in the other two school locations. More often than not those who were recognized and valued by age-mates did well in social studies but not necessarily so in science or mathematics. In only a few instances were boys or girls who achieved high scores on the three tests viewed negatively by their peers (boys in community B). The factors specific to boys and to girls sometimes accentuated and sometimes suppressed the quality of performances, depending upon the school location. With these resevations about sex-role and community variations in mind, attention was directed to modal patterns for boys, for girls, and for the total population after a consideration of peer status as a criterion measure.

Measure of Peer Status (IPS)

As a form of age-mate appraisal, IPS Peer Status was defined in the description of variables (Appendix D, p. 2), with a fuller account and illustrations of IPS values in a later portion of the report (Appendix J). Unfortunately, the necessary sociographs and index values for the ninth grades had only been derived for community B within the time limit set for this report. Therefore,Table H-5 is concerned with values for IPS Peer Status computed in 1958 to illustrate their regression upon the set of factor variables.

Peer acceptance, estimated by IPS Peer Status, was regarded as evidence of behavior socially valued by one's age-mates. Index values, ranging from +6.00 to -9.00, not only reflected "place" in an adolescent society (McGuire & Clark, 1952) but also the nature of more immediate experiences with and pressures imposed by age-mates as well as the expectations which peers probably hold about each member at a particular time (McGuire, 1953, 1956; McGuire, White, & Murphy, 1960).

As in the case of other forms of age-mate appraisal (pp.6-8), the attributes combined in Peer Stimulus Value almost invariably received the highest weights among the grade VII factor variables. The exception was among girls in community A where Absence of Negative Valuations appeared to be even more important. Both Cognitive Approach, except among girls in communtiy C,and Divergent Thinking,with the exception of boys in D, either played little part in the age-mate assessments or had negative loadings. On the other hand, the qualities of socialized morele and emotional stability represented in Socially-Oriented Achievement Motivation generally gave that factor variable a positive weight. Among girls, the factor provisionally named Perceptual Defenses characterized girls who had relatively low peer status.

Only in one case, boys in community A, did the factor variables account for more than fifty per cent of the variance in IPS Peer Status. On the other hand, a test of significant (Appendix G, p. 4) showed that each of the multiple correlation coefficients was significant. Apparently there were other factors, not yet measured, involved in peer appraisals of one another as represented by sociographs and the indices of peer status.

Modal Patterns of Regression over Three Years

The analyses so far had demonstrated that the sets of factor variables for boys, for girls, and for both combined actually did predict highly significant proportions of the variance in a range of talented behavior in the junior high school years. True, there were variations from community to community and between boys and girls in each school location. Nevertheless, some modal patterns also had emerged from the analyses in Tables H-2, H-3, H-4, and H-5 for both sex roles and for the total population.

Table H-6 was constructed to draw together in one place regressions of the academic criterion measures on the seventh-grade factor variables over a three-year period. Pertinent data for boys, girls, and the total populations studied in grades VII, VIII, and IX were arranged in columns for each criterion measure to facilitate comparisons. These data represented multiple correlations for each set of regression weights, tests, for a significant difference between pairs of multiple correlation coefficients for the same criterion measure, and coefficients of resemblance between regression weights for the three years taken pair by pair.

The problem was to establish the validity of the factor variables as measures which explained and predicted modal patterns of talented behavior in junior high school students regardless of community. Limits of time required a short cut for cross-validation (Guilford, 1954, pp. 405-406) and precluded any attempts to establish validity generalization (Cronbach, 1960, pp. 355-356). Were the regression weights for each of the factor variables reasonably similar to one another from grades VII to VIII to IX for each criterion measure? Was there any significant shrinkage in the multiple correlations of criteria with sets of factor scores for the population sampled in grade IX compared with that used for grades VII and VIII? If both questions were answered in the affirmative, the factor variables could be developed to the point where they formed a differential prediction battery (Horst, 1954) for several kinds of valued academic performances and, possibly, for other types of talented behavior.

The test of shrinkage, labeled "F-tests" in the table, was based upon obtained deviations from regression when pairs of multiple correlations for the same criterion were compared (Appendix G, p. 4). Adjustments were made for the degrees of freedom in each year, so that

$$F = \frac{(1 - R_i^2)\,(N_j - k_j - 1)}{(1 - R_j^2)\,(N_i - k_i - 1)}$$

and degrees of freedom were $(N_i - k_i - 1)$and $(N_j - k_j - 1)$, respectively. Resemblance of regression weights for pairs of years was determined by correlating loading magnitudes of the factor variables, a procedure used earlier to determine factors "common" to both sexes (Appendix G, p. 11).

Significant shrinkages in the multiple correlations for grade IX were found in only two of fifteen possible instances. The regressions of STEP Science upon sets of factor variables produced significantly smaller multiple correlation coefficients for girls and for the total population. All the others were not significantly different from or were significantly greater than the coefficients for grades VII and VIII. This finding not only provided evidence for validity but also for the underlying assumptions about the nature of the factor variables (p. 10). Certainly the kinds of shrinkage frequently encountered did not occur.

Every test of resemblance yielded positive results. For each criterion measure, the weights attached to factor variables for boys, for girls, and for the population studied were reasonably similar from one year to another. Only in the instance of CAT Arithmetic for boys did the level of confidence drop to .05 for the correlation, $r_{79} = .72$, between loading magnitudes in grades VII and IX. Apparently the reason for the lower resemblance was the shift in weights for Divergent Thinking and Antisocial Wariness, with reversals in signs over the period of time.

From the foregoing analyses, the research group concluded that the factor variables were reasonably valid measures which served to explain a surprisingly large proportion of the variance in several kinds of talented behavior, both academic and non-academic. When objective tests of academic achievement or comprehension were the criterion measures, the abilities and aptitudes comprising Cognitive Approach tended to have the highest weights. Nevertheless, from community to community and between boys and girls, the other factor variables served to show the ways in which cognitive qualities were supplemented, modified, or suppressed by less goal-bound thinking, personal attributes and expectations, or pressures imposed by others. Modal patterns for boys and for girls, as well as for total population, also were identified and these patterns persisted over the grade VII, VIII, and IX school years. Thus the factor variables provided valuable leads not only for the explanation of some kinds of talented behavior but also for the development of a multiple prediction battery with varying weights for different kinds of predictions (Horst, 1954; Michael, 1957).

Table H-1

Optimal Weights of Indicators for Factor Variables
(Rounded to two decimal places)

Factor Variable	Indicator of Talented Behavior	Factor Loadings	Optimal Weights
	Common to both Sexes		
A. Cognitive Approach (CA)	STEP Listening	.73*	.26
	CTMM Mental Function	.69*	.21
	Gestalt Transformation	.60*	.19
	DAT Mechanical Reasoning	.59*	.19
	Rhymes	.59*	.09
R = .88	Gestalt Completion	.47*	.09
	ISS Family Status	.45*	.07
	DRT Reaction Time	.41*	.07
	Unusual Uses	.57*	.07
B. Divergent Thinking (DT)	Consequences	.61*	.32
	Seeing Problems	.61*	.32
R = .75	Common Situations	.60*	.28
C. Socially-Oriented Achievement Motivation (AM)	JPQ 8: Socialized Morale	.66*	.31
	SSHA Scholastic Motivation	.60*	.22
	JPQ 3: Emotional vs Stable	-.60*	-.20
	JPQ 9: Independent	-.52*	-.17
R = .85	CYS Criticism of Education	-.51*	-.17
	CMAS Anxiety	-.52*	-.17
	JPQ 6: Sociability	.39*	.11
D. Peer Stimulus Value (SV)	Nom 1: Peer Acceptance	.72*	.50
	Nom 3: Effectiveness	.59*	.25
R = .78	Nom 5: Quiet Dependency	-.45*	-.23

*Highest loading for the indicator variable in a factor structure

Table H-1 (continued)

Factor Variable	Indicator of Talented Behavior	Factor Loadings	Optimal Weights
B. Absence of Negative Valuations (NV)	Nom 2: Absence of Negative Model Value	.63*	.46
R = .72	Nom 4: Nondeviant vs Deviant Behavior	.59*	.39
	Specific to Boys		
F. Anxious Emotionality (AE)	CMAS Anxiety	.68*	.45
	CYS Personal Maladjustment	.57*	.29
R = .77	JPQ 1: Sensitivity	.33*	.20
	JPQ 3: Emotionality	.43*	.12
G. Anti-Social Wariness (AW)	CYS Authoritarian	.30*	.42
	CYS Neg. Soc. Orientation	.51*	.22
	CYS Critic of Education	.31	.21
R = .67	Short Words	.31*	.18
	Mutilated Words	.30	.16
	Specific to Girls		
H. Sensitive Dependency (SD)	CYS Authoritarian	.43*	.34
	JPQ 1: Sensitivity	.45*	.33
R = .67	JPQ 8: Socialized Morale	.40	.26
	JPQ 11: Surgent/Desurgent	-.35*	-.15
I. Perceptual-Motor Skills (PM)	Gestalt Completion	.39	.25
	CYS Neg. Soc. Orientation	-.29	-.19
R = .48	Dotting	.31	.16
	DRT Reaction Time	.28	.11

(continued)

Table H-1 (continued)

Factor Variable	Indicator of Talented Behavior	Factor Loadings	Optimal Weights
	Factor IV for Total Population		
J. Practical-Minded Toughness (PT)	JPQ 1: Sensitive vs Tough	-.56*	-.42
	DAT Mechanical Reasoning	.36	.28
	Mutilated Words	-.34	-.26
R = .71	Short Words	-.31*	-.18
	JPQ 8: Socialized Morale	-.31	-.08
	Factor VI for Total Population		
K. Anxious-Dependent Resentment (AR)	CMAS Anxiety	.46	.30
	CYS Authoritarian	.46*	.27
R = .68	CYS Neg. Soc. Orientation	.49*	.26
	JPQ 11: Surgent/Desurgent	-.29*	-.25

Table H-2

Regression of Criterion Measures of Talented Behavior upon Factor Variables for a Sample Population of Boys and Girls Attending Grades VII and VIII in Four School Locations[1,2]

(Rounded to two places, decimal points omitted)

Factor Variable		Community A			Community B			Community C			Community D			Population		
		M	F	Total	M	F	Total	M	F	Total	M	F	Total	M	F	Total
	N =	72	97	169	58	68	126	121	118	239	78	65	143	329	348	677
GPA Teacher Evaluation (Grade VII)																
A. Cognitive Approach		37	22	25	60	50	48	24	41	35	44	33	42	34	38	35
B. Divergent Thinking		..	..	03	-18	15	..	10	33	16	..	..	03	..	10	05
C. S-O Achvt. Motiv'n		24	31	26	-09	..	..	15	..	08	19	19	09	17	11	14
D. Peer Stimulus Value		39	31	34	27	27	27	39	22	30	32	41	31	35	29	31
E. Abs. Neg. Valuations		12	10	14	08	05	08	26	25	24	25	08	22	20	17	18
F. Anxious Emotionality		..			-08			05			07			..		
G. Anti-Social Wariness		13			..			-03			04			..		
H. Sensitive Dependency			-06			06			09			-18			03	
I. Perceptual-Motor			-10			-07			..			..			-07	
J. Prac-Mind. Toughness				-18			-21			-21			-21			-18
K. Anx-Depnt. Resentment				-04			-10			..			-13			-04
Factor,	R^2	58	38	51	53	53	53	43	68	56	50	47	48	43	46	47
	R	76	62	71	73	73	73	66	82	75	71	69	69	66	68	69
Indicator,	R^2	72	59		72	70		64	68		65	71		57	56	55
(App. G)	R	85	77		85	84		80	82		81	84		75	75	74
	N	161	157		94	112		266	241		113	98		634	608	1242
CAT Arithmetic Achievement (Grade VII)																
A. Cognitive Approach		42	31	34	54	66	60	64	52	63	31	49	59	51	50	54
B. Divergent Thinking		18	09	13	-03	..	..	-13	18	..	..	..	05	-08	04	-03
C. S-O Achvt. Motiv'n		06	03	03	-26	36	13	14	10	07	13	23	07	08	12	05
D. Peer Stimulus Value		-06	31	12	11	-10	...	17	07	13	35	13	22	14	11	12
E. Abs. Neg. Valuations		14	08	16	...	..	-04	05	17	10	29	24	26	12	14	11
F. Anxious Emotionality		04			-43			03			13			..		
G. Anti-Social Wariness		22			23			09			27			19		
H. Sensitive Dependency			..			-18			02			-03			..	
I. Perceptual-Motor			-14			22			..			-07			..	
J. Prac-Mind. Toughness				-18			-06			-19			-22			-18
K. Anx-Depnt. Resentment				..			-03			..			..			03
Factor,	R^2	35	33	32	48	52	41	45	58	51	46	46	41	36	40	38
	R	59	57	57	69	72	64	67	76	71	68	68	64	60	63	62
Indicator,	R^2	61	59		67	60		62	65		62	61		51	52	49
	R	78	77		82	77		78	81		79	78		71	72	70
	N	[illegible]	157		94	112		266	241		113	98		634	608	1242

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[1] The population was composed of students enrolled in grade VII, who had continued to grade VIII, and who had scores for all instruments administered during the two years at the time this exploratory study of factor variables was undertaken. All tables in this appendix, except Table H-1, involved data obtained from this sample population.

[2] The entries in the columns, unless otherwise noted, are regression weights for the factor variables named on the left side of the table. The criterion measures of talented behavior are identified above the regression weights. Data from Appendix G for the regression of indicator variables are included for comparative purposes.

Table H-2 (continued)

Factor Variable	Community A			Community B			Community C			Community D			Population		
	M	F	Total	M	F	Total	M	F	Total	M	F	Total	M	F	Total
CAT Reading Achievement (Grade VII)															
A. Cognitive Approach	60	48	50	73	72	62	69	66	68	52	44	54	62	62	63
B. Divergent Thinking	04	05	09	06	..	05	-04	18	03	-04	26	12	..	12	05
C. S-O Achvt. Motiv'n	14	..	09	-18	10	..	18	-04	03	32	29	19	13	03	08
D. Peer Stimulus Value	-05	15	05	11	18	16	05	11	09	25	..	12	10	11	09
E. Abs. Neg. Valuations	-06	09	04	-12	09	..	..	10	05	05	11	05	-04	09	03
F. Anxious Emotionality	..			-15			..			09			..		
G. Antisocial Wariness	06			-07			..			29			08		
H. Sensitive Dependency		-05			05			..			-21			..	
I. Perceptual-Motor		-07			09			-13			..			-08	
J. PracMind. Toughness			-05			-05			-19			-16			-15
K. Anx-Depnt. Resentment			..			-05			-15			-05			-05
Factor, R_f	63	59	60	70	82	74	74	85	80	74	78	71	69	76	73
Indicator, R_i	82	84		83	84		81	85		81	83		78	81	78
CAT Language Achievement (Grade VII)															
A. Cognitive Approach	60	19	36	58	59	53	60	57	60	35	45	51	53	51	53
B. Divergent Thinking	-05	05	03	-15	05	..	..	19	05	04	09	04	..	07	03
C. S-O Achvt. Motiv'n	..	..	-03	-12	-05	-04	10	..	..	21	13	..	07	..	..
D. Peer Stimulus Value	22	28	14	..	20	10	16	08	12	24	12	11	11	17	12
E. Abs. Neg. Valuations	07	27	20	10	-08	..	-08	12	..	19	20	16	..	12	05
F. Anxious Emotionality	-14			-13			06			14			..		
G. Antisocial Wariness	04			22			04			31			18		
H. Sensitive Dependency		-12			..			07			..			03	
I. Perceptual-Motor		-11			15			-03			04			..	
J. Prac-Mind. Toughness			-18			-32			-35			-47			-33
K. Anx-Dpnt. Resentment			-15			-04			-08			-04			-05
Factor, R_f	63	53	57	60	73	67	66	75	73	65	59	66	62	63	66
Indicator, R_i	81	82		82	84		81	83		75	81		75	77	75
STEP Social Studies (Grade VII)															
A. Cognitive Approach	59	55	53	59	63	59	76	72	77	64	68	70	64	68	67
B. Divergent Thinking	..	15	08	15	-15	03	-03	14	04	04	-03	05	07	06	06
C. S-O Achvt. Motiv'n	17	..	04	..	..	..	06	09	..	21	11	06	09	03	03
D. Peer Stimulus Value	..	..	..	05	18	08	10	..	07	10	30	13	05	09	07
E. Abs. Neg. Valuations	-03	08	05	-08	15	05	..	08	03	09	..	08	..	08	02
F. Anxious Emotionality	22			..			04			..			04		
G. Antisocial Wariness	08			05			02			04			07		
H. Sensitive Dependency		-05			08			-10			-11			-04	
I. Perceptual-Motor		-24			16			..			04			-06	
J. Prac-Mind. Toughness			-11			-17			-12			-21			-15
K. Anx-Depnt. Resentment			..			..			-08			-12			-05
Factor, R_f	60	65	59	69	69	67	77	88	83	75	85	89	71	77	73
Indicator, R_i	80	84		84	82		79	86		79	85		75	77	73

R_f = Multiple correlation of criterion measure with the set of factor variables with optimal weights in Table H-1.

R_i = Multiple correlation of criterion measure with the set of indicator or dimensional variables, Table G-7.

Table H-2 (continued)

Factor Variable	Community A			Community B			Community C			Community D			Population		
	M	F	Total	M	F	Total	M	F	Total	M	F	Total	M	F	Total
STEP Science (Grade VII)															
A. Cognitive Approach	65	51	53	65	64	63	70	73	70	64	67	65	64	66	67
B. Divergent Thinking	-09	06	..	10	16	12	-07	04	..	04	..	04	..	03	..
C. S-O Achvt. Motiv'n	16	-03	07	25	-16	03	06	03	09	21	09	18	14	..	07
D. Peer Stimulus Value	..	16	04	08	08	06	06	06	06	10	12	07	06	11	06
E. Abs. Neg. Valuations	12	16	17	-10	-14	-06	08	05	06	09	-04	04	06	03	04
F. Anxious Emotionality	27			19			..			..			08		
G. Antisocial Wariness	10			-07			..			04			..		
H. Sensitive Dependency		..			12			-03			-08			..	
I. Perceptual-Motor		-26			-06			-07			-12			-10	
J. Prac-Mind. Toughness			-04			-14			..			-10			-08
K. Anx-Depnt. Resentment			..			03			..			-07			..
Factor, R_f	67	66	62	77	73	72	71	82	76	75	78	73	69	74	71
Indicator, R_i	79	77		85	78		79	85		77	81		75	77	73

Significant Differences Between Multiple Correlations, R_f and R_i, for Criterion Measures

Criterion	Community A			Community B			Community C			Community D			Population		
	M	F	Total	M	F	Total	M	F	Total	M	F	Total	M	F	Total
GPA Teacher Evaluation	*	*		*	*		*	..		..	*		**	*	**
CAT Arithmetic	**	**		*	..		*	..		..	..		**	*	**
CAT Reading	**	**		*	..		*	..		..	..		*	*	**
CAT Language	**	**		**	*		**	*		..	**		**	**	**
STEP Social Studies	**	*		*	*		..	..		..	..		..	..	..
STEP Science	*	*		..	..		*	..		..	..		..	..	..

*F-test significant at the .05 level of confidence

**F-test significant at the .01 level of confidence

..F-test does not show a significant difference between the two multiple correlation coefficients for the same criterion measure (Appendix G), with appropriate degrees of freedom for subjects drawn from the same population and different sets of predictor variables.

Table N-3

Regression of Age-Mate Appraisals of Talented Behavior upon Factor Variables for a Sample Population of Boys and Girls Attending Grades VII and VIII in Four School Locations

(Rounded to two places, decimal points omitted)

Factor Variable	Age-Mate Appraisals Derived from Nominations by Peers								
	Actor	Artistic	Athletic	Creative	Mechan'l	Musical	Number	Rhetoric	Talented
	Boys (N = 329)								
A. Cognitive Approach	-05	08	-07	14	22	-13	09	12	03
B. Divergent Thinking	..	-06	-02	..	-07	12	-03	-04	08
C. S-O Achvt. Motivation	11	04	-05	..	06	07	10	17	06
D. Peer Stimulus Value	66	44	77	47	48	42	62	62	61
E. Abs. Neg. Valutations	-09	02	06	-10	-06	..	09	..	-02
F. Anxious Emotionality	08	..	..	..	08	12	..	12	05
G. Antisocial Wariness	..	..	..	-05	-03	-02	13	04	..
	Girls (N = 348)								
A. Cognitive Approach	03	21	-05	04	..	06	10	15	13
B. Divergent Thinking	..	..	..	..	..	..	..	..	-03
C. S-O Achvt. Motivation	11	-06	..	07	..	..	03	..	..
D. Peer Stimulus Value	69	47	45	63	14	59	63	64	63
E. Abs. Neg. Valuations	-17	..	08	-09	07	-09	14	09	-10
H. Sensitive Dependency	08	04	-14	04	-03	06	10	07	07
I. Perceptual-Motor Skills	06	03	03	..	03	..	-05	-04	-03
	Total Population (N = 677)								
A. Cognitive Approach	..	14	-05	10	14	..	12	13	09
B. Divergent Thinking	..	-04	..	..	-04	04	-03	-04	..
C. S-O Achvt. Motivation	02	..	-08	04	..	..	08	07	05
D. Peer Stimulus Value	68	46	62	55	28	50	62	63	62
E. Abs. Neg. Valuations	11	..	05	-09	-05	-04	10	03	-06
J. Prac-Minded Toughness	-07	..	11	03	34	-09	-09	-11	-02
K. Anx-Depndt. Resentment	03	..	..	..	16	..	06	03	03
	Multiple Correlation Coefficients								
Boys (N = 329)	67	46	73	55	57	44	69	69	66
Girls (N = 348)	74	56	47	67	..	62	69	71	69
Total (N = 677)	70	50	60	61	50	53	69	70	66

Note: Age-mate appraisals, the criterion measures employed in this table, were defined in Appendix D with the exception of "Actor" and "Number." Stimulus-items for "Actor" and "Math Ability" appeared in Appendix C. Stanine values for the age-mate appraisals were derived from transformed scores for the nominations received by each boy and girl from age-mates at the school location.

Table H-4

Regression of Criterion Measures of Talented Behavior in Grade VIII upon Factor Variables in Grade VII for a Sample Population of Junior High School Students

(Rounded to two places, decimal points omitted)

Factor Variables - Grade VII (1957-58)	Criterion Measures of Talented Behavior in Grade VIII (1958-59)								
	Teacher GPA	CAT Arith.	CAT Reading	CAT Language	STEP Soc. St.	STEP Science	DAT Space	DAT Abstract	STEP Listening
Boys (N = 329)									
A. Cognitive Approach	41	69	68	59	64	64	56	52	63
B. Divergent Thinking	..	...	05	..	05	08	-10	..	11
C. S-O Achvt. Motivation	14	06	12	16	06	09	05	05	..
D. Peer Stimulus Value	40	17	09	11	09	-04	-04	11	06
E. Abs. Neg. Valuations	18	18	03	02	09	06	11	12	..
F. Anxious Emotionality	-03	..	03	05	..	..	..	09	..
G. Antisocial Wariness	..	07	07	17	..	-02	..	-02	-08
Grade VIII, R	66	63	77	69	73	70	55	59	72
Grade VII, R_f	66	60	69	62	71	69	—	—	—
Indicators, (VII) R_i	75	71	78	75	75	75	—	—	78
Girls (N = 348)									
A. Cognitive Approach	65	50	65	55	70	71	52	63	69
B. Divergent Thinking	16	05	10	10	07	05	-05	-05	11
C. S-O Achvt. Motivation	07	14	07	..	-03	..	07	-03	..
D. Peer Stimulus Value	25	16	06	16	05	-04	..	08	03
E. Abs. Neg. Valuations	18	18	09	09	10	09	11	10	04
H. Sensitive Dependency	08	..	..	03	..	-03	..	04	-04
I. Perceptual-Motor Skills	-08	-05	-03	-06	-06	..	..	-07	-07
Grade VIII, R	73	69	75	68	75	73	54	65	77
Grade VII, R_f	68	63	76	63	77	74	—	—	—
Indicators (VII), R_i	75	72	81	77	77	77	—	—	75
Total Population (N = 677)									
A. Cognitive Approach	61	54	67	55	67	68	53	58	64
B. Divergent Thinking	09	..	06	05	05	07	-07	-03	12
C. S-O Achvt. Motivation	10	07	09	03	..	..	08	..	..
D. Peer Stimulus Value	27	16	06	11	07	-04	..	10	04
E. Abs. Neg. Valuations	20	17	05	06	07	08	12	11	..
J. Prac-Minded Toughness	-10	-17	-14	-37	-10	..	05	-08	-03
K. Anx-Depndt. Resentment	-08	..	-04	-09	-06	-04	03	..	-09
Grade VIII, R	71	67	76	73	74	71	54	61	75
Grade VII, R_f	69	62	73	66	73	71	—	—	—
Indicators (VII), R_i	74	70	78	75	73	73	—	—	75

Note: R = Multiple correlation of scores on the criterion measure at the close of the eighth grade (1958-59) with stanine values on factor variables from grade VII (1957-58)

R_f = Multiple correlation of scores on the criterion measure at the close of the seventh grade (1957-58) with stanine values on factor variables in same year (Table H-2)

R_i = Multiple correlation of scores on the criterion measure at the close of the seventh grade (1957-58) with a set of indicator or dimensional variables (Appendix G)

Table H-5

Regression of Criterion Measures of Talented Behavior in Grade IX upon Factor Variables in Grade VII for 730 Boys and Girls Attending Junior High Schools in Four Communities from 1957 to 1960

(Rounded to two places, decimal points omitted)

Factor Variables based upon Grade VII Indicators	Community A			Community B			Community C			Community D			Population		
	M	F	Total	M	F	Total	M	F	Total	M	F	Total	M	F	Total
Population, N =	101	108	209	61	86	147	139	111	250	65	59	124	366	364	730
GPA Teacher Evaluation (Grade IX)[†]															
A. Cognitive Approach				44	37	35	22	57	29						
B. Divergent Thinking				..	12	06	06	04	07						
C. S-O Achvt. Motiv'n				11	..	07	06	08	21						
D. Peer Stimulus Value				30	33	35	27	02	17						
E. Abs. Neg. Valuations				16	08	16	13	26	20						
F. Anxious Emotionality				06			-09								
G. Antisocial Wariness				06			-09								
H. Sensitive Dependency					..			10							
I. Perceptual Defences[‡]					-04			-03							
Grades VII to IX, R^2				48	44	43	25	53	32						
R				69	66	65	50	73	56						
Grades VII to VIII, R_t	—	—	—	—	—	—	—	—	—	—	—	—	66	73	71
Grades VII to VII, R_f	76	72	61	73	73	73	66	82	75	71	69	69	66	68	69
Gr. VII Indicators, R_i	85	77	—	85	84	—	80	82	—	81	84	—	75	75	74
CAT Arithmetic Achievement (Grade IX)															
A. Cognitive Approach	44	50	42	57	65	60	56	66	56	21	58	42	49	59	51
B. Divergent Thinking	-06	09	05	07	..	04	13	09	14	04	-08	-04	05	05	06
C. S-O Achvt. Motiv'n	04	06	11	-17	08	-03	10	..	11	21	28	30	04	08	10
D. Peer Stimulus Value	37	12	26	24	11	16	06	03	05	28	28	26	19	10	17
E. Abs. Neg. Valuations	18	24	19	..	24	14	14	22	18	22	06	17	13	21	18
F. Anxious Emotionality	-08			-08			..			-19			-08		
G. Antisocial Wariness	04			..			..			21			06		
H. Sensitive Dependency		-05			-03			..			06			-03	
I. Perceptual Defenses[‡]		-04			05			-11			-12			-04	
Grades VII to IX, R^2	63	50	53	58	51	50	47	65	53	35	64	41	47	54	49
R	79	71	73	76	71	70	69	81	73	59	80	64	68	74	70
Grades VII to VIII, R_t	—	—	—	—	—	—	—	—	—	—	—	—	63	69	67
Grades VII to VII, R_f	59	57	57	69	72	64	67	76	71	68	68	64	60	63	62
Gr. VII Indicators, R_i	78	77	—	82	77	—	78	81	—	79	78	—	71	72	70

[†] GPA Teacher Evaluations from Communities A and D for Grade IX were not available at the time of this report.

[‡] Factor I (Girls), Perceptual-Motor Skills, re-interpreted as Perceptual Defenses after a study of the data.

Note: R = Multiple correlation of scores on the criterion measure at the close of the ninth grade (1959-60) with the stanine values of factor variables based upon indicators from grade VII (1957-58).

R_t = Multiple correlation of grade VIII criteria (1958-59) and grade VII factor scores (Table H-4).

R_f = Multiple correlation of grade VII criteria (1957-58) and grade VII factor scores (Table H-2).

R_i = Multiple correlation of grade VII criteria (1957-58) and grade VII indicators (Tables G-1, G-2).

..Zero loading for factor variable in set of predictors for the criterion measure.

—Multiple correlation coefficient and regression of criterion measure on set of predictors not computed.

Table H-5 (continued)

Factor Variables (Grade VII)	Community A			Community B			Community C			Community D			Population		
	M	F	Total	M	F	Total	M	F	Total	M	F	Total	M	F	Total
CAT Reading Achievement (Grade IX)															
A. Cognitive Approach	64	70	62	59	76	66	75	73	73	71	68	67	72	69	69
B. Divergent Thinking	-07	..	..	09	07	05	04	07	08	-13	09	..	..	05	03
C. S-O Achvt. Motiv'n	37	16	24	-07	04	..	08	10	13	35	21	28	19	13	16
D. Peer Stimulus Value	08	-07	03	31	..	14	09	..	05	..	..	..	10	..	05
E. Abs. Neg. Valuations	08	11	08	-14	04	..	07	07	06	-03	04	..	..	03	05
F. Anxious Emotionality	10			03			03			14			08		
G. Antisocial Wariness	-03			..			04			06			04		
H. Sensitive Dependency		-06			07			-06			..			..	
I. Perceptual Defenses		-12			-05			-09			-15			-05	
Grade VII to IX, R^2	73	55	62	70	58	59	65	76	67	49	68	53	62	61	60
R	85	74	78	84	76	77	81	87	82	70	82	73	79	78	77
Grade VII to VIII, R_t	—	—	—	—	—	—	—	—	—	—	—	—	77	75	76
Grade VII to VII, R_f	63	59	60	70	82	74	74	85	80	74	78	71	69	76	73
Gr. VII Indicators, R_i	82	84	—	83	84	—	81	85	—	81	83	—	78	81	78
CAT Language Achievement (Grade IX)															
A. Cognitive Approach	49	33	38	46	70	54	67	67	55	56	43	35	60	56	49
B. Divergent Thinking	-09	17	09	17	06	08	-04	07	07	..	13	20	..	09	10
C. S-O Achvt. Motiv'n	30	12	20	-08	12	06	11	08	17	29	04	06	16	09	18
D. Peer Stimulus Value	14	26	22	25	08	19	..	-03	04	12	23	15	11	11	11
E. Abs. Neg. Valuations	19	31	23	-09	05	..	..	17	11	10	-16	04	05	15	11
F. Anxious Emotionality	-08			-05			03			-08			..		
G. Antisocial Wariness	-03			16			07			23			11		
H. Sensitive Dependency		-14			..			..			14			-03	
I. Perceptual Defenses		..			04			-02			-31			-04	
Grade VII to IX, R^2	67	57	58	54	62	50	42	60	45	52	51	39	48	52	46
R	82	75	76	73	79	70	65	77	67	72	71	62	70	72	68
Grade VII to VIII, R_t	—	—	—	—	—	—	—	—	—	—	—	—	69	68	73
Grade VII to VII, R_f	63	53	57	60	73	67	66	75	73	65	59	66	62	63	66
Gr. VII Indicators, R_i	81	82	—	82	84	—	81	83	—	75	81	—	75	77	75
STEP Social Studies (Grade IX)															
A. Cognitive Approach	64	54	54	48	68	62	66	60	63	65	55	57	63	59	60
B. Divergent Thinking	-16	-05	-07	21	19	18	05	..	05	-03	13	16	04	05	06
C. S-O Achvt. Motiv'n	08	14	13	-13	13	04	..	11	12	36	16	20	05	11	12
D. Peer Stimulus Value	11	06	09	23	-07	06	..	..	..	..	19	08	05	04	05
E. Abs. Neg. Valuations	12	06	09	-09	..	-03	07	10	10	08	-08	04	05	04	05
F. Anxious Emotionality	-08			-09			-04			13			..		
G. Antisocial Wariness	..			-11			-22			18			03		
H. Sensitive Dependency		-12			-10			..			-04			-06	
I. Perceptual Defenses		-15			06			-22			-10			-07	
Grade VII to IX, R^2	49	40	41	59	64	58	51	58	50	54	65	54	48	51	48
R	70	63	64	77	80	76	71	76	71	73	81	73	69	71	69
Grade VII to VIII, R_t	—	—	—	—	—	—	—	—	—	—	—	—	73	75	74
Grade VII to VII, R_f	60	65	59	69	69	67	77	88	82	75	85	89	71	77	73
Gr. VII Indicators, R_i	80	84	—	84	82	—	79	86	—	79	85	—	75	77	73

Table H-5 (continued)

Factor Variables (Grade VII)	Community A			Community B			Community C			Community D			Population		
	M	F	Total	M	F	Total	M	F	Total	M	F	Total	M	F	Total
STEP Science (Grade IX)															
A. Cognitive Approach	64	60	64	45	70	62	69	69	73	45	70	62	61	66	68
B. Divergent Thinking	-05	-07	-09	15	03	07	17	10	10	-13	-07	-13	09	..	..
C. S-O Achvt. Motiv'n	08	12	..	-10	05	..	..	..	-06	22	09	10	..	02	-03
D. Peer Stimulus Value	-04	-04	-04	07	-10	-07	-10	-15	-14	11	..	10	..	-06	-06
E. Abs. Neg. Valuations	14	07	12	-14	..	-12	08	02	04	13	21	13	05	04	03
F. Anxious Emotionality	12			-20			04			..			04		
G. Antisocial Wariness	..			09			..			-04			..		
H. Sensitive Dependency		-21						..			-09			-03	
I. Perceptual Defenses		..			-07			..			09			..	
Grade VII to IX, R^2	44	40	40	38	49	42	61	50	58	52	57	50	44	43	43
R	66	63	63	62	70	65	78	71	76	72	75	71	66	65	66
Grade VII to VIII, R_t	—	—	—	—	—	—	—	—	—	—	—	—	70	73	71
Grade VII to VII, R_f	67	66	62	77	73	72	71	82	76	75	78	73	69	74	71
Gr. VII Indicators, R_i	79	77	—	85	78	—	79	85	—	77	81	—	75	77	73
STEP Mathematics (Grade IX)															
A. Cognitive Approach	66	51	60	60	79	75	63	59	65	53	66	57	62	62	65
B. Divergent Thinking	-07	04	-04	16	09	11	10	13	07	21	-29	..	07	06	05
C. S-O Achvt. Motiv'n	..	07	07	..	..	..	14	..	..	11	10	13	09	..	02
D. Peer Stimulus Value	08	..	03	-08	-13	-12	..	-10	-06	..	07	..	..	-06	-05
E. Abs. Neg. Valuations	15	14	14	-12	12	..	15	08	07	12	08	17	06	09	08
F. Anxious Emotionality	-14			-05			12			11			..		
G. Antisocial Wariness	03			..			..			12			06		
H. Sensitive Dependency		..			-07			-07			19			-04	
I. Perceptual Defenses		..			-08			-09			..			07	
Grade VII to IX, R^2	61	33	46	44	67	56	49	47	47	54	33	36	48	43	45
R	78	57	68	66	82	75	70	69	69	73	57	60	69	66	67
IPS Peer Status (1958)[†]															
A. Cognitive Approach	06	-08	-04	-26	-22	-16	-06	13	..	-12	..	-11	-08	..	-08
B. Divergent Thinking	-09	-12	-10	16	-09	..	-09	-17	-11	-03	-06	-07	..	-12	-06
C. S-O Achvt. Motiv'n	-06	07	07	16	-10	..	17	07	15	05	08	11	09	04	08
D. Peer Stimulus Value	67	33	49	52	57	49	36	45	41	64	41	58	53	41	48
E. Abs. Neg. Valuations	30	36	33	13	04	09	05	30	18	12	35	21	17	28	23
F. Anxious Emotionality	..			-03			..			..			..		
G. Antisocial Wariness	..			04			15			03			03		
H. Sensitive Dependency		..			-06			..			03			..	
I. Perceptual Defenses		-15			-15			-04			-12			-12	
Regression, R^2	54	22	34	27	23	19	20	32	23	38	32	33	31	23	26
Multiple Cor'n, R	73	47	58	52	48	44	45	57	48	62	57	57	56	48	50

[†] IPS Peer Status values for grade IX were incomplete since all sociographs for 1959-60 had not been constructed; this portion of the table is designed to show possible relation of peer acceptance, determined sociographically, to the scores of boys and girls on the factor variables in the four communities.

Note: In grade IX, during 1959-60, the advanced or senior high school forms of the CAT and STEP batteries were administered as criterion measures; see Appendixes B and D for further information about the tests.

Table H-6

Tests of Significance Between Multiple Correlation Coefficients

and Resemblance Between Regression Coefficients for Criterion Measures

(Rounded to two places, decimal points omitted)

Factor Variables and Statistics	Boys			Girls			Population		
	VII	VIII	IX	VII	VIII	IX	VII	VIII	IX
N =	329	329	366	348	348	364	677	677	730
GPA Teacher Evaluation*									
A. Cognitive Approach	34	41	--	38	45	--	35	41	--
B. Divergent Thinking	00	00	--	10	16	--	05	09	--
C. S-O Achvt. Motivation	17	14	--	11	07	--	14	10	--
D. Peer:Stimulus Value	35	40	--	29	25	--	31	27	--
E. Abs. Neg. Valuations	20	18	--	17	18	--	18	20	--
F. Anxious Emotionality	00	-03	--						
G. Antisocial Wariness	00	00	--						
H. Sensitive Dependency				03	03	--			
I. Perceptual Defenses				-07	-08	--			
J. Prac-Minded Toughness							-16	-10	--
K. Anx-Dependt. Resentment							-04	-08	--
Multiple Correlation, R	.66	.66	--	.68	.73	--	.69	.71	--
F-tests: F_{78}, F_{89}, F_{79}	1.02	--	--	1.15	--	--	1.06	--	--
Resemblance: r_{78}, r_{89}, r_{79}	.98**	--	--	.95**	--	--	.92**	--	--
CAT Arithmetic Achievement									
A. Cognitive Approach	51	49	49	50	50	59	54	54	51
B. Divergent Thinking	-08	00	05	04	05	05	-03	00	06
C. S-O Achvt. Motivation	08	06	04	12	14	08	05	07	10
D. Peer Stimulus Value	14	17	19	11	16	10	12	16	17
E. Abs. Neg. Valuations	12	18	13	14	18	21	11	17	18
F. Anxious Emotionality	00	00	-08						
G. Antisocial Wariness	19	07	-06						
H. Sensitive Dependency				00	00	-03			
I. Perceptual Defenses				00	-05	-04			
J. Prac-Minded Toughness							-18	-17	...
K. Anx-Dependt. Resentment							03	00	...
Multiple Correlation, R	.60	.63	.68	.63	.69	.69	.62	.67	.70
F-tests: F_{78}, F_{89}, F_{79}	1.07	1.13	1.21*	1.15	1.13	1.30*	1.13	1.08	1.21**
Resemblance: r_{78}, r_{89}, r_{79}	.93**	.92**	.72*	.97**	.97**	.97**	.98**	.99*	.96**
CAT Reading Achievement									
A. Cognitive Approach	62	68	72	62	65	69	63	67	69
B. Divergent Thinking	00	05	00	12	10	05	05	06	03
C. S-O Achvt. Motivation	13	12	19	03	07	13	08	09	16
D. Peer Stimulus Value	10	09	10	11	06	00	09	06	05
E. Abs. Neg. Valuations	-04	03	00	09	09	08	03	05	05
F. Anxious Emotionality	00	03	08						
G. Antisocial Wariness	08	07	04						
H. Sensitive Dependency				00	00	00			
I. Perceptual Defenses				-08	-03	-05			
J. Prac-Minded Toughness							-15	-14	...
K. Anx-Dependt. Resentment							-05	-04	...
Multiple Correlation, R	.69	.77	.79	.76	.75	.78	.73	.76	.77
F-tests: F_{78}, F_{89}, F_{79}	1.27*	[illegible]	1.37**	1.05	1.13	1.08	1.12	1.05	1.17*
Resemblance: r_{78}, r_{89}, r_{79}	.98**	.98**	.98**	.99**	.98**	.96**	.99**	.99**	.99*

Table H-6 (continued)

Factor Variables and Statistics	Boys			Girls			Population		
	VII	VIII	IX	VII	VIII	IX	VII	VIII	IX
N =	329	329	366	348	348	364	677	677	730
CAT Language Achievement									
A. Cognitive Approach	53	59	60	51	55	56	53	55	49
B. Divergent Thinking	00	00	00	07	10	09	03	05	10
C. S-O Achvt. Motivation	07	16	16	00	00	09	00	03	18
D. Peer Stimulus Value	11	11	11	17	16	11	12	11	11
E. Abs. Neg. Valuations	00	02	05	12	09	15	05	06	11
F. Anxious Emotionality	00	05	00						
G. Antisocial Wariness	18	17	11						
H. Sensitive Dependency				03	03	-03			
I. Perceptual Defenses				00	-06	-04			
J. Prac-Minded Toughness							-33	-37	...
K. Anx-Dependt. Resentment							-05	-09	...
Multiple Correlation, R	.62	.69	.70	.63	.68	.72	.66	.73	.68
F-tests: F_{78}, F_{89}, F_{79}	1.19	1.01	1.19	1.11	1.13	1.25*	1.19*	1.15	1.04
Resemblance: r_{78}, r_{89}, r_{79}	.98**	.99**	.97**	.95**	.97**	.97**	.95**	.96**	.94**
STEP Social Studies									
A. Cognitive Approach	64	64	63	68	70	59	67	67	60
B. Divergent Thinking	07	05	04	06	07	05	06	05	06
C. S-O Achvt. Motivation	09	06	05	03	-03	11	03	00	12
D. Peer Stimulus Value	05	09	[illegible]	09	05	04	07	07	05
E. Abs. Neg. Valuations	00	09	05	08	10	04	02	07	05
F. Anxious Emotionality	04	00	00						
G. Antisocial Wariness	07	00	03						
H. Sensitive Dependency				-04	00	-06			
I. Perceptual Defenses				-06	-06	-07			
J. Prac-Minded Toughness							-15	-10	...
K. Anx-Dependt. Resentment							-05	-06	...
Multiple Correlation, R	.71	.73	.69	.77	.75	.71	.73	.74	.69
F-tests: F_{78}, F_{89}, F_{79}	1.06	1.11	1.04	1.07	1.11	1.19	1.04	1.15	1.11
Resemblance: r_{78}, r_{89}, r_{79}	.97**	.99**	.99**	.89**	.96**	.98**	.97**	.97**	.99**
STEP Science									
A. Cognitive Approach	64	64	61	66	71	66	67	68	68
B. Divergent Thinking	00	08	09	03	05	00	00	07	00
C. S-O Achvt. Motivation	14	09	00	00	00	02	07	00	-03
D. Peer Stimulus Value	06	-04	00	11	-04	-06	06	-04	-06
E. Abs. Neg. Valuations	06	06	05	03	09	04	04	08	03
F. Anxious Emotionality	08	00	04						
G. Antisocial Wariness	00	-02	00						
H. Sensitive Dependency				00	-03	-03			
I. Perceptual Defenses				-10	00	00			
J. Prac-Minded Toughness							-08	00	...
K. Anx-Dependt. Resentment							00	-04	...
Multiple Correlation, R	.69	.70	.64	.74	.73	.65	.71	.71	.66
F-tests: F_{78}, F_{89}, F_{79}	1.04	1.12	1.08	1.04	1.21	1.27*	1.01	1.14*	1.14*
Resemblance: r_{78}, r_{89}, r_{79}	.96**	.98**	.95**	.95**	.99**	.94**	.96**	.99**	.96**

* Significant at the .05 level of confidence. ** Significant at the .01 level of confidence.

*GPA Teacher Evaluations were not available for the four communities to compute grade IX values.

***To estimate resemblance of regression loadings for "total" boys or girls with weights in the last column, only the correlations for the five factor variables "common" to both sexes were computed.

APPENDIX I

DIFFERENCES AMONG HIGHLY-INTELLIGENT STUDENTS

To follow up an earlier study of the behavior and achievement of gifted children beginning in the third grade (Haggard, 1957), an inquiry into differences among highly-intelligent or potentially-gifted students in the four school locations was undertaken. Among gifted boys and girls in the seventh grade of a university laboratory school, Haggard and his co-workers found that "high general achievers" had retained a high degree of mental flexibility, controlled and channeled their anxieties, became more competitive and independent of adults, and were respected more than liked by their peers. The "high achievers" in reading, arithmetic, spelling and language differed in their perceptions of the world about them, the ways in which they related to it, and certain aspects of intellectual functioning. Sex differences in patterns of linquistic achievement were related to the greater proficiency of boys in abstract reasoning and the more tangible, rule-bound skills acquired by girls, partly a consequence of social pressures and expectations. The findings clearly indicated that age-mates exerted strong pressures which frequently were not openly observable but nonetheless added to the pressures imposed by parents and, to a lesser extent, teachers who wanted the boys and girls to achieve academically. Haggard concluded that certain academic areas more than others were compatible with the personality structure of a given child, and that he or she would show an affinity for some school subjects and find other much more difficult.

During 1957-58, in the seventh grade, 226 students, 127 boys and 97 girls, were identified as highly-intelligent or potentially-gifted students in the four communities (Appendix A, Table A-2). The criterion measure was CTMM Mental Function and the attainment of a score that was one standard deviation or more above the mean for the total population. Intelligence quotients ranged from 113 to 140 on the CTMM test, 142 being in the range I.Q. 113-121 and 84 having I.Q. 122-140. Of these eligible students, 213 completed all of the necessary instruments for the study, 120 being boys and 93 girls. This was a larger population than the 45 children studied from grades III to VII in the laboratory school setting.

A number of limitations were recognized by the research team undertaking this study of highly-intelligent junior high school students. The most important one was that the stanine values for variables, based upon distributions for the total population, were employed in all computations to save time and permit the use of IBM 650 equipment. Thus many of the distributions for the criterion measures and for the indicator and factor variables, especially those of a cognitive nature, were restricted in range. Subsequent to this report, this same population is to be studied further using only the distributions for the highly-intelligent students with any necessary transformations to normalize the data. This step should sharpen differences among the potentially-gifted boys and girls and probably would yield more efficient indicators and factor variables as well as higher multiple correlations with criterion measures. Nevertheless, the research group believed that much could be explained about highly-intelligent students by using original stanine values for all of the variables as punched upon their IBM cards. In addition, the tables in this appendix were designed to give a clearer picture of the steps employed in the analyses of data for the Human Talent Project since a smaller number of subjects was involved.

Master Intercorrelation Matrix

Table I-1 was constructed to illustrate the type of master intercorrelation matrix used for both factor and regression analyses. The first 32 variables named in the table were selected as probable indicators of talented behavior, especially the kinds of academic performances valued in junior high schools. A similar set of dimensional variables was employed in an earlier study of the total population (Appendix G). The remaining six variables were the criterion measures; namely, GPA Teacher Evaluation, CAT achievement, and STEP comprehension tests for the seventh grade.

The table revealed some interesting patterns of association between and among indicator and criterion variables for the highly-intelligent students. Assuming that correlation coefficients of $r = \pm .18$ or greater were significant at the .01 level of confidence, each indicator had small but substantial correlations with other dimensional variables. Only a few were .50 or greater, the largest being between CMAS Anxiety and CYS Maladjustment and between the nomination factor variables, Peer Acceptance and Effectiveness. Among the 32 potential indicators, only six lacked substantial correlations with one or more of the six criterion measures; namely, Gestalt Completion, Emotionality vs Stability, Surgency vs Desurgency, CYS Authoritarian, CYS Maladjustment, and Model Value. Each of these variables, however, did have significant associations with one or more of the criteria in previous studies of the total or sub-populations. Finally, the intercorrelations among the criterion measures all were significant but each pair had less than 40 per cent common variance.

Indicators and Academic Talents

Table I-2 was devised to summarize the regressions of six criterion measures of academic talent upon the 32 indicator or dimensional variables for the highly-intelligent students. The basic data, transferred to IBM cards, were the entries for indicators and criteria in the intercorrelation maxtrix. As in earlier computations, an iterative technique (Bottenberg, 1960; Greenberger & Ward, 1956) was used to obtain sets of regression weights for indicators (Appendix G, pp. 2-3). Every indicator was represented in at least two, and all but ISS Family Status had loading weights in at least three sets of predictors. No attempt was made to find the most efficient subsets of predictors (Appendix G, pp. 3-4) since factor variables were to be derived as the next step in the analyses of the data. This step was deemed advisable since the master intercorrelation matrix had shown some significant associations between indicator variables and the development of factor variables would reduce the probability of linear restraints (Guilford, 1954, pp. 403-405).

The multiple correlation coefficients at the base of Table I-2 all were significant (Appendix G, p. 4). Sets of regression weights for indicators selected by the iterative technique accounted for more than 50 per cent of the variance in GPA Teacher Evaluations, CAT Reading, and CAT Language. For these three criterion measures, the multiple correlations were similar to those for the total population (Tables G-5, G-7). The smallest amount of variance was explained in the case of STEP Science where the multiple R was much lower than for the total population. This had been anticipated since courses in general science were offered at the seventh-grade level in only two of the four communities. Thus the more able boys and girls were more likely to have the abilities and general knowledge to cope with the STEP test of comprehension and their range of scores would be restricted.

Development of Factor Variables

Since the indicators of dimensional variables each were represented in sets of predictors for criterion measures, all 32 were retained for the development of factor variables. The first step was to sort or map the indicators into a smaller number of factors. Again the master intercorrelation matrix provided the basic data, this time the correlations among the 32 indicators. Following procedures developed earlier (Appendix G, p. 10), centroid factors were extracted and rotated to an orthogonal normal varimax solution (Kaiser, 1958, 1960).

Table I-3 summarized the obtained factor loadings and communalities of the 32 indicator variables for the 213 highly-intelligent (HMF) seventh-grade students. By and large, the communalities or proportions of variance each indicator had in common with the others were somewhat smaller than for the total population (Table G-8). Substantial increases were noted, however, in Short Words, JPQ 3 Emotionality vs Stability, JPQ 9 Independent Domiance, SSHA Scholastic Motivation, and CYS Personal Maladjustment. Rather large decreases occurred in the cases of Gestalt Completion, JPQ 6 Socialibility vs Withdrawal, and CYS Negative Social Orientation.

Table I-4 was compiled to show the provisional names of the HMF factor variables, the significant indicators for each factor with their loadings, and the optimal weights for each set of indicator variables. Seven factors were extracted and given different names than those for the total population (Grade G-9) since their composition and loading weights for indicators differed. Signs for factors 5 and 6 were reversed to give them psychological meaning. Optimal weights for the estimation of factors in persons (Cattell, 1957, pp. 287-296; Guilford, 1954, pp. 524-526) were obtained by the multiple regression method used before the the total population (Table H-1). In each instance, the optimally-weighted indicators accounted for more than 50 per cent of the variance in the new factor variables. This inference was made from the multiple correlation coefficients, placed in the right-hand column of the table, which represent the strength of the relation between a factor and its indicators.

Interpretation of HMF Factor Variables

The factors described in Table I-4 were shown in the order they emerged from the analysis and were given arabic numbers to distinguish them from those obtained for the total population. Indicators for each factor variable were listed in the approximate order of their optimal weights. The optimal weights did not necessarily correspond to the factor loadings since the multiple regression procedure, with the loadings as validity coefficients for each indicator, removed linear restraints brought about by intercorrelation among the indicators. Thus JPQ 8 Socialized Morale, which had a substantial loading for the first factor, had a low optimal weight since it was correlated with a number of other measures in the set of indicators.

Factor 1, Personal Stability. - Persons with high factor scores represent themselves as being stable individuals with strong egos, capable of coping with ego-involving and stressful situations, aware of social restraints, motivated toward scholastic achievement, sociable and acceptant of standards, and as effectively-functioning human beings. There is some correspondence to Socially-Oriented Achievement Motivation for the total population (Table H-1) but the optimal weight for JPQ 8 is reduced drastically and there are some changes in the composite indicators.

Factor 2, Divergent Thinking. - Boys and girls with high factor scores perform well on tests which require them to think in different directions, sometimes searching and sometimes seeking variety (Guilford, 1959). Apparently they are less goal-bound than persons who seek the "one right answer." They appear to be fluent, flexible, sensitive, and aware of external stimuli of a verbal nature. The factor is similar to Divergent Thinking in the total population (Table H-1) where Unusual Uses and STEP Listening were absent as indicators.

Factor 3, Convergent Thinking. - Individuals with high factor scores perform well on tests which require either "one right answer" or which value a recognized or conventional response (Guilford, 1959). They are able to educe structural relationships from figural materials, reason logically and with numbers, redefine or shift the function of a part of an object and use it in another way, and pay attention to directions. The factor appears to be one part of Cognitive Approach in the total population (Table H-1) where five additional indicators were associated with the four that define the HMF factor variable.

Factor 4, Symbol Aptitude.- Persons with high factor scores readily recognize symbolic units either embedded in rows of letters or partly mutilated. In addition, they are fluent with words, discriminate rapidly, show finger and wrist dexterity, and perceive spatial relationships. Many of the indicators fall under the heading of cognition (Guilford, 1959), the ability to discover new and recognize old information. The factor as such was not found in the total population, although Rhymes, DRT, and CTMM formed a part of Cognitive Approach.

Factor 5, Conforming Behavior.- Individuals with high factor scores seldom were named by their age-mates as negative models (not like to be like, not ask for help, not party with) or as showing deviant behavior (dislikes school, has to be told, gets by). While not necessarily recognized, they apparently conform to expectations, accept authoritarian beliefs and the control of authority figures, and show interest in detailed exact undertakings. The factor is similar to Absence of Negative Valuations in the total population (Table H-1) but has additional indicators to define the psychological meaning.

Factor 6, Age-Mate Acceptance.-Boys and girls with high factor scores are accepted by their peers (party with, like to be like, work with) and are expected to be effectively functioning persons (enjoys everything, self confident, shows initiative). They also represent themselves as well-adjusted individuals. Their age-mates seldom regard them as quiet, dependent persons (quiet ones, left out, adult-oriented). The factor is similar to Peer Stimulus Value in the total population (Table H-1) but a negative weight for CYS Maladjustment has been added.

Factor 7, Antisocial Attitude.-Persons with high factor scores represent themselves as being tough-minded, negative toward teachers and critical of what is expected in school, alienated in social relations, and having ineffective study habits and attitudes toward school work. In addition, their age-mates seldom regard these individuals as being quiet, dependent boys or girls. The factor as such was not found in the total population, the component indicators being scattered through Antisocial Wariness for boys, Perceptual Defenses (originally Perceptual-Motor Skills) for girls, and Practical-Minded Toughness in the total population (Table H-1).

Correlation Studies of HMF Factor Variables

Table I-5 was constructed to show the intercorrelations of the HMF factor variables after factor scores had been computed for the 213 grade VII boys and girls. Assuming $r = \pm .1765$ to be significant at the .01 level of confidence, the factor variables were not entirely independent of one another. Most noticeable were the small but positive relation of Personal Stability to Age-Mate Acceptance and negative association with Antisocial Attitudes which, in turn, was negatively related to Conforming Behavior. In addition, Symbol Aptitude had some common variance with Convergent Thinking and with Age-Mate Acceptance. Only one of the factor variables, Divergent Thinking appeared to be relatively independent of the others. Nevertheless, none of the correlations represented more than ten per cent common variance between factors; hence linear restraints were regarded as being minimal for multiple regression studies.

Table I-6 was compiled to depict correlations of HMF factor variables with the six criterion measures of academic talent and Table I-7 to show intercorrelations of the latter variables. All of the criteria has some variance in common but no pair had as much as 50 per cent, the highest correlation being between STEP Science and CAT Reading. Among the HMF factor scores, only Personal Stability (the first extracted) had no significant association with a measure of academic performance.

Explanatory Value of HMF Factor Variables

Three questions remained to be answered. Of what value were the HMF factor values in explaining variations inacademic performanced evaluated by teachers and in different subject-matter areas as measured by objective tests? Could sets of factor variables obtained in the seventh grade be used to predict the several kinds of academic talents valued at the close of the ninth grade without significant shrinkage in multiple correlations or shifts in weights for the factor scores? Finally, did the study of this highly-intelligent sample of boys and girls from public schools confirm, modify, or deny any of the results reported in a longitudinal study in a laboratory school (Haggard, 1957)?

Relation of Factor Variables to Criterion Measures

Table I-8 was constructed to summarize the results of six regression studies involving criterion measures and the HMF factor variables. Basic data for the iterative procedures were the entries in Tables I-5 and I-6. Sets of regression weights were computed and entered in the columns along with sums of squares for regression and the multiple correlation coefficients. The rationale and procedures were the same as for previous analyses (Appendix G, pp. 2-4; Appendix H, pp. 1-3).

With one exception, STEP Science, the multiple correlation coefficients for the factor variables were appreciably lower than those for the regression of the criterion measures on the 32 indicators (Table I-2). This shrinkage with the use of factor scores was not unexpected since it had been encountered in the analyses for the total population (Table H-2). Two gains were anticipated. One was that the HMF factors would yield a more meaningful explanation of variation in performances than the fluctuating sets of indicators. The other was the expectation, demonstrated for the total population (Table H-6), that there would be gains rather than shrinkages in the predictive value of the factor variables from grades VII to VIII to IX.

Inspection of Table I-8 revealed some interesting differences in the patterns of regression weights attached to the HMF factor variables from one criterion measure to another. Teacher evaluations, based upon grade point averages (GPA), yielded the set of weights most different from the remainder. This was also true for the total population (Table H-2) but in a somewhat different pattern for the HMF sample. Apparently seventh-grade teachers of highly-intelligent boys and girls valued qualities which made for acceptance by age-mates and devalued deviant or non-conforming behavior. By and large, they appreciated the ability to think divergently as well as aptitudes with symbolic materials. Among the potentially-able students a surprisingly low weight was attached to channeled, convergent kinds of thought processes. Expressions of antisocial attitudes either impaired the quality of performances in school by the HMF students or they were viewed negatively by their teachers.

Some of the performances in grade VII on the tests measuring achievements in subject-matter areas provided patterns of weights which could be evaluated in the light of the previously-mentioned laboratory school study. Haggard (1957, pp. 399-400) related excellence in reading speed and comprehension to intellectual activity and the ability to relate symbols with their more tangible referents. In CAT Reading, the weights for divergent thinking and aptitude with symbols, which accompany the ability to channel or control thought processes, seemed to bear out these inferences. On the other hand, Haggard (pp. 395-396) found that "high achievers" in reading often withdrew into themselves and viewed their world and other persons from a distance. Negative weights for personal stability and conforming behavior gave some support to this interpretation. The enhancement of performance among persons accepted by age-mates and the suppressing influences of antisocial attitudes were quite evident in all criterion measures, although they had the least effect for STEP Science.

In the laboratory school study, Haggard inferred that intellectual passivity and obedient carrying-out of rules learned by rote were necessary for success in spelling and language tests (p. 399). The nagative weight for divergent thinking and positive values attached to aptitude with symbols in the regressions for CAT Language supported this inference. Moreover, the negative loading for personal stability indicated that some HMF students who excelled in the language test were unstable, anxious individuals somewhat similar to those in the Haggard study (P. 396). Qualities involved in age-mate acceptance received their highest weight for objective tests and the negative influences of antisocial attitudes were quite apparent in determining CAT Reading achievement.

Ability to achieve at a high level in arithmetic, Haggard inferred

(p. 400), depended upon ability to deal with symbolic relationships and controlled intellectual manipulations. For CAT Arithmetic, these inferences were supported by the magnitude of weights attached to symbol aptitude and convergent thinking. On the other hand, the small but negative loading for personal stability contradicted the laboratory school finding that "high achievers" in arithmetic had the healthiest egos (p. 397). Relative independence from peers, however, was reflected in the smaller weight for acceptance by age-mates. Negative influences of antisocial attitudes were largest in magnitude for CAT Reading.

The subject areas evaluated by the two tests of comprehension and ability to interpret data, STEP Social Studies and STEP Science, had no parallels in the laboratory school study. In both kinds of performances, ability to channel thought processes was paramount but aptitude with symbols and divergent thinking also aided in achievement. The ability to search about, or think divergently, had its highest loading for STEP Science. On the other hand, acceptance by age-mate had its lowest value and those who expressed antisocial attitudes in self reports were least penalized in that subject area. Those who excelled in STEP Social Studies were valued more highly by peers and had a small but positive weight for personal stability.

Predictive Value of HMF Factor Variables

By the ninth grade, only 102 of the original 203 students in the HMF sample completed junior high school in the same location and responded to all of the criterion measures of academic talent in 1958-59 and 1959-60. Of these highly-intelligent subjects, 53 were boys and 49 were girls. This sample of HMF students had to serve as subjects for testing the predictive value of the HMF factor variables.

Tables I-9 and I-10 were constructed to show the regressions of criterion measures upon the HMF factor variables in grades VIII and IX respectively. In each table, regression weights and multiple correlation values were computed for boys and girls separately as well as for the total remaining HMF population. Since GPA Teacher Evaluations were not available, STEP Mathematics was substituted in the ninth-grade tables to permit a comparison of weights with CAT Arithmetic.

To facilitate comparisons, multiple correlation coefficients from the regression analyses of preceding years were placed at the base of each table. Limited time to prepare this report precluded the computation of tests of significance between multiple correlations for the same criterion measures and coefficients of resemblance between sets of regression weights (Appendix H, p. 16; Table H-6). Inspection of the coefficients for the total HMF population in the three junior high schools, however, led to certain conclusions. First, the factor variables based upon grade seven measures did not account for as much of the variance in the criterion measures as did sets of indicators selected from the 32 dimensional variables by the iteration process. This result, as mentioned earlier, was expected in the light of experiences with analyses for the total population. The value of the HMF factor variables was hypothesized to be in their convenience for explaining what contributed to valued performances on the different criterion measures and their validity. To establish their validity, for present purposes, regression weights of the factors for each criterion should be reasonably similar from grade VII through grade IX and there should be no significant shrinkage in the multiple correlations obtained in grade IX compared with grade VII.

The second conclusion, arrived at by inspection of the multiple correlation coefficients at the base of Table I-10 was that there was no shrinkage from grade VII to grade IX in the magnitude of the Rs. In fact there was a small increase in multiple correlations between each of the criteria and sets of factor scores in every instance. This included GPA Teacher Evaluation from the seventh to the eighth grade as shown in Table I-9. The foregoing statements should be modified, however, by adding that there were unexplained fluctuations over the three years for two of the criterion measures, STEP Social Studies and STEP Science. For example, the values of R for STEP Science were .60, .49, and .62 for regressions on the factor scores in grades VII, VIII, and IX respectively. Inspection showed that there were some variations in weights, especially for CAT Language from one grade to another. Consequently, without computing coefficients of resemblance between loading weights from one year to another, no conclusive statement could be made about the validity of the HMF factor variables as predictors of academic talents at this point in the analyses of the data.

The third conclusion drawn from careful study of the tables was that there were some important sex-typed differences between highly-intelligent girls and boys. For example, in Table I-9, very different patterns of weights for the regression of GPA Teacher Evaluation upon the HMF factor variables were found for boys and girls. The same observation was true, to some extent at least, for every one of the CAT and STEP tests in the different subject areas. True, there are some similarities. For instance, in CAT Language, symbol aptitude had a very high weight for both sexes in the prediction of performances on CAT Language in grade VIII and IX. Apparently further studies of highly-intelligent or potentially-gifted young people are going to have to take a much greater account of possible sex differences than the research team did in this pilot study. This would include the development of factor variables "specific" to each sex role, and the determination of those "common" to both boys and girls, as well as careful attention to means of establishing the validity of factor scores as explanatory and predictive devices.

Table 1-1

Intercorrelational Matrix of 32 Indicator Variables and Six Criterion Measures for 313 Boys and Girls of High Mental Function

No.	Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	Var.No.
1.	CTMM Mental Function	1.0	36	31	25	40	24	21	13	15	30	19	18	15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-14	26	19	09	16	20	02	40	63	31	33	40	32	1
2.	STEP Listening		1.0	09	13	28	27	18	15	16	17	13	19	36	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-06	23	12	-08	20	03	-04	31	50	33	27	47	38	2
3.	DAT Mechanical			1.0	33	13	16	05	04	00	-07	10	-02	-04	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-07	08	-09	03	-13	07	01	-06	16	07	24	21	27	3
4.	Gestalt Transformation				1.0	20	11	05	-09	-08	01	08	01	01	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-06	08	-13	02	-07	13	13	02	23	10	17	27	22	4
5.	Rhymes					1.0	28	19	-01	10	32	08	36	30	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	02	09	13	-19	17	04	11	26	43	43	35	31	-10	5
6.	Unusual Uses						1.0	26	34	26	13	16	14	06	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	07	09	03	-13	06	03	-07	19	18	13	08	32	19	6
7.	Consequences							1.0	43	36	27	09	02	21	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-03	11	25	-08	16	07	00	31	15	20	17	12	06	7
8.	Common Situations								1.0	48	19	01	-08	10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-10	17	23	-02	14	-03	-04	20	09	-03	01	07	01	8
9.	Seeing Problems									1.0	18	05	09	17	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	03	12	10	-08	09	04	03	18	19	10	09	15	-02	9
10.	Mutilated Words										1.0	19	39	25	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-05	08	31	03	34	11	-02	42	24	39	30	12	18	10
11.	Gestalt Completion											1.0	10	07	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-05	09	04	12	06	05	-10	13	12	06	06	12	02	11
12.	Short Words												1.0	22	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	05	02	13	08	20	14	14	29	30	38	36	22	12	12
13.	Dotting													1.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-10	16	36	00	34	10	02	33	18	25	13	07	06	13
14.	DRT Reaction Time														1.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-16	-09	07	01	12	06	03	14	13	17	22	13	12	14
15.	JPQ 1: Sensitivity															1.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	03	07	12	01	18	14	36	23	06	15	06	02	-09	15
16.	JPQ 3: Emotionality																1.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	37	-03	-17	-16	-20	-06	-14	-13	-13	-08	-11	-17	01	16
17.	JPQ 6: Sociability																	1.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-07	07	-06	05	-02	01	-03	03	09	17	19	09	07	17
18.	JPQ 8: Socialized Morals																		1.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-09	10	20	12	16	12	08	23	04	24	16	02	-06	18
19.	JPQ 9: Independent																			1.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	27	-14	-14	-10	-26	-08	01	-20	06	-13	-08	-02	05	19
20.	JPQ 11: Surgency																				1.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	07	00	05	-21	06	-10	-02	07	-05	09	-08	-04	-10	20
21.	SSHA Schol. Motiv's																					1.0	[illegible]	[illegible]	[illegible]	[illegible]	-33	26	28	22	32	03	-05	34	23	19	22	28	08	21
22.	GMAS Anxiety																						1.0	[illegible]	[illegible]	[illegible]	63	-07	-17	-15	-16	-03	06	-21	-08	-13	-09	-12	-06	22
23.	CYS Authoritarian																							1.0	[illegible]	[illegible]	-02	02	-01	08	-06	-03	08	-03	04	03	06	-07	-11	23
24.	CYS Critic. Education																								1.0	[illegible]	23	-07	-30	-07	-22	-02	00	-19	-10	-18	-13	-04	05	24
25.	CYS Neg. Soc. Orient's																									1.0	21	-10	-21	-08	-17	-09	-03	-25	-10	-15	00	-07	-02	25
26.	CYS Maladjustment																										1.0	-06	-23	-22	-13	00	19	-16	-04	-09	-07	-06	03	26
27.	SES Family Status																											1.0	17	-05	16	-11	01	22	25	12	13	17	10	27
28.	Nom 1: Peer Acceptance																												1.0	02	65	01	-36	30	19	21	19	14	-02	28
29.	Nom 2: Non-Neg. Model																													1.0	-03	48	10	17	-02	-03	11	07	-04	29
30.	Nom 3: Effectiveness																														1.0	-10	-23	30	25	23	17	20	08	30
31.	Nom 4: Non-Deviant																															1.0	19	21	04	10	18	09	07	31
32.	Nom 5: Quiet Dependency																																1.0	06	07	20	09	04	08	32
33.	GPA Teacher Evaluation																																	1.0	46	47	47	32	22	33
34.	CAT Reading																																		1.0	60	36	57	39	34
35.	CAT Language																																			1.0	62	34	24	35
36.	CAT Arithmetic																																				1.0	38	34	36
37.	STEP Social Studies																																					1.0	34	37
38.	STEP Science																																						1.0	38

Table I-2

Regression of Criterion Measures of Talented Behavior on 32 Indicator Variables for 213 Junior High School Students of High Mental Function

(Rounded values, decimal points omitted)

Indicators	Teacher GPA	CAT Reading	CAT Language	CAT Arith.	STEP Soc. St.	STEP Science
1. CTMM Mental Function	19	47	39	38	10	14
2. STEP Listening	07	29	09	06	29	30
3. DAT Mechanical Reasoning	-04	-03	07	17	06	18
4. Gestalt Transformation	..	07	-04	..	15	..
5. Rhymes (verbal facility)	..	13	09	06	09	06
6. Unusual Uses	10	-08	03	-07	19	04
7. Consequences	11	..	10	09	..	..
8. Common Situations	-04	..	-27	-11	-10	..
9. Seeing Problems	..	07	03	..	09	-12
10. Mutilated Words	13	-07	16	07	-09	11
11. Gestalt Completion	..	..	-06	-09	..	-11
12. Short Words	06	15	19	22	08	..
13. Dotting	05	..	03	-08	-09	..
14. IRT Reaction Time	..	..	-04	05	09	08
15. JPQ 1: Sensitivity	07	..	..	03	04	-03
16. JPQ 3: Emotionality	05	03	10	08	-03	07
17. JPQ 6: Sociability	-03	..	04	12	-03	04
18. JPQ 8: Social Morale	..	-05	18	07	-11	..
19. JPQ 9: Independent	..	..	04	..	06	06
20. JPQ 11: Surgency	06	-04	13	..	..	-08
21. SSHA Schol. Motivation	10	06	..	06	28	07
22. CMAS Anxiety	-05	..	-07	..	-05	-07
23. CYS Authoritarian	..	08	03	..	..	-05
24. CYS Critic Education	04	..	-09	-07	06	08
25. CYS Neg. Soc. Orien'n	-11	-05	-10	03	..	-03
26. CYS Maladjustment	..	05	..	03	07	06
27. ISS Family Status	-05	..	04	..	..	..
28. N-1: Peer Acceptance	25	..	03	08	07	-12
29. N-2: Model Value	12	..	-03	05	08	..
30. N-3: Effectiveness	16	08	..	..	08	07
31. N-4: Non-Deviant	05	-10	-08	..	..	..
32. N-5: Quiet Dependency	12	04	14	04	05	03
Multiple correlation, R	75	76	75	68	67	55

Table I-3

Orthogonal Normal Varimax Factor Loadings and Communalities of 32 Indicator Variables for 213 Grade VII Students of High Mental Function (IQ 113 to 140)
(Rounded values, decimal points omitted)

Indicators	Factors							h^2
	1	2	3	4	5	6	7	
1. CTMM Mental Function	11	27	52	37	-15	-06	-05	52
2. STEP Listening	21	31	32	23	27	-06	-09	38
3. DAT Mechanical Reasoning	-10	09	59	-03	-11	04	24	44
4. Gestalt Transformation	-01	-01	45	15	-08	17	04	27
5. Rhymes (verbal facility)	-03	13	27	57	17	01	-08	45
6. Unusual Uses	-01	46	18	19	13	06	24	35
7. Consequences	05	56	04	09	-04	-15	01	35
8. Common Situations	05	64	03	-10	-03	-14	-10	46
9. Seeing Problems	00	57	-04	08	05	-01	-01	34
10. Mutilated Words	-03	27	-03	51	-14	-26	05	42
11. Gestalt Completion	05	17	12	22	-07	01	17	13
12. Short Words	-01	-03	-05	64	-03	-02	06	42
13. Dotting	14	17	-04	40	09	-25	-24	33
14. IRT Reaction Time	08	-06	09	35	04	-04	-13	16
15. JPQ 1: Sensitivity	02	04	-29	21	00	03	-55	44
16. JPQ 3: Emotionality	-75	-09	06	-09	06	02	-09	59
17. JPQ 6: Sociability	46	25	-07	10	02	24	-05	35
18. JPQ 8: Social Morale	49	25	-27	15	-18	09	-31	54
19. JPQ 9: Independent	-67	-11	25	-14	-01	01	04	55
20. JPQ 11: Surgency	-09	-02	-15	09	36	-05	-10	18
21. SSHA Schol. Motivation	60	19	05	02	-19	-17	-33	57
22. CMAS Anxiety	-72	14	-19	04	01	21	-02	62
23. CYS Authoritarian	-08	00	01	-12	-35	-03	-09	15
24. CYS Critic Education	-31	-07	04	01	10	21	45	36
25. CYS Neg. Soc. Orient'n	-34	05	-03	08	-08	18	33	27
26. CYS Maladjustment	-56	13	-23	02	09	30	03	48
27. ISS Family Status	11	29	22	-04	12	-06	-19	20
28. N-1: Peer Acceptance	13	21	-11	18	-04	-81	-10	77
29. N-2: Model Value	22	-11	01	07	-62	-81	03	46
30. N-3: Effectiveness	15	19	-11	27	11	-64	-13	58
31. N-4: Non-Deviant	06	-01	06	27	-46	10	-10	31
32. Quiet Dependency	-12	-05	05	11	-13	37	-35	31

Table I-4

Orthogonal Loadings and Optimal Weights of Indicators for HMP Factor Variables

HMP Factor Variables	Indicators of Talented Behavior	Factor Loadings	Optimal Weights	R
1. Personal Stability	JPQ 3: Emotionality vs Ego Strength	-.75*	-.31	.91
	CMAS Anxiety ("to avoid failure")	-.72*	-.27	
	JPQ 9: Independent Dominance	-.67*	-.20	
	SSHA Scholastic Motivation	.60*	.12	
	JPQ 6: Sociability vs Withdrawal	.46*	.12	
	CYS Personal Maladjustment	-.56*	-.14	
	CYS Negative Social Orientation	-.34*	-.08	
	JPQ 8: Socialized Morale	.49*	.05	
2. Divergent Thinking	Common Situations (ideational fluency)	.64*	.33	.79
	Consequences (conceptual flexibility)	.56*	.25	
	Seeing Problems (sensitivity to)	.57*	.24	
	Unusual Uses (spontaneous flexibility)	.46*	.20	
	STEP Listening (awareness to stimuli)	.31	.12	
3. Convergent Thinking	DAT Mechanical Reasoning (eduction)	.59*	.42	.74
	CTMM Mental Function (comprehension)	.52*	.28	
	Gestalt Transformation (redefinition)	.45*	.23	
	STEP Listening (attention)	.32*	.14	
4. Symbol Aptitude	Short Words (recognize symbolic units)	.64*	.40	.80
	Rhymes (word fluency, verbal facility)	.58*	.28	
	Mutilated Words (symbolic closure)	.51*	.19	
	DRT Reaction Time (discrimination)	.35*	.14	
	Dotting (finger and wrist dexterity)	.40*	.13	
	CTMM Mental Function (space relations)	.37	.07	
5. Conforming Behavior	Nom 2: Absence of Negative Model Value	.62*	.46	.75
	CYS Authoritarian Discipline	.35*	.28	
	Nom 4: Nondeviant vs Deviant Behavior	.46*	.22	
	JPQ 11: Surgency vs Desurgency	-.36*	-.12	
6. Age-Mate Acceptance	Nom 1: Peer Acceptance	.81*	.63	.84
	Nom 3: Social Effectiveness	.64*	.19	
	CYS Personal Maladjustment	-.20	-.12	
	Nom 5: Quiet Dependency	-.37*	-.08	
7. Antisocial Attitude	JPQ 1: Sensitivity vs Toughness	-.55*	-.39	.72
	CYS Criticism of Education	.45*	.28	
	Nom 5: Quiet Dependency	-.35	-.25	
	CYS Negative Social Orientation	.33	.15	
	SSHA Scholastic Motivation	-.33	-.09	

*Highest factor loading for the indicator variable in Table I-3; interpretations within parentheses are hypotheses about the factor content of the indicator.

Table I-5

Intercorrelation of Factor Variables for 213 HMF Junior High School Students

(Decimal points omitted)

HMF Factor Variables	Pers. Stab. 1	Diver. Think. 2	Conv. Think. 3	Symb. Aptd. 4	Conf. Behvr. 5	A-M Accept. 6	Anti. Attd. 7
1. Personal Stability	.....	1180	-0421	-0086	1210	2385	-3266
2. Divergent Thinking		.....	1286	1540	-0106	1606	-0344
3. Convergent Thinking			.....	1787	1655	0024	1173
4. Symbol Aptitude				.....	-0131	2456	-0880
5. Conforming Behavior					.....	-0983	-1841
6. Age-Mate Acceptance						.....	-0123
7. Antisocial Attitude							.....
Regression on Indicators, R^2	8202	6216	5416	6421	5550	6991	5123
Multiple Correlation, R	9056	7884	7358	8013	7449	8361	7157

Table I-6

Correlation of HMF Factor Variables with Criterion Measures for 213 Students

(Decimal points omitted)

HMF Factor Variables	Criterion Measures					
	Teacher GPA	CAT Reading	CAT Language	CAT Arithm'c	STEP Soc. St.	STEP Science
1. Personal Stability	1658	0020	-0016	0499	1286	0418
2. Divergent Thinking	2667	1989	0463	1355	2257	2828
3. Convergent Thinking	1544	4264	2587	3533	3836	5135
4. Symbol Aptitude	3381	3759	4671	4339	2666	3120
5. Conforming Behavior	1935	-0131	0269	1160	0892	0519
6. Age-Mate Acceptance	4402	2052	2363	1853	1965	1412
7. Antisocial Attitude	-2248	-1049	-2439	-2465	-1253	-0656

Table I-7

Intercorrelation of Criterion Measures for 213 HMF Boys and Girls in Grade VII
(Decimal points omitted)

Criterion Measures of Talented Behavior	Teacher GPA	CAT Reading	CAT Language	CAT Arithm'c	STEP Soc. St.	STEP Science
A. GPA Teacher Evaluation	....	4507	4268	4737	3873	4650
B. CAT Reading Achievement		....	5481	5557	6125	6969
C. CAT Language Achievement			....	6260	3941	4035
D. CAT Arithmetic Achievement				....	5093	5414
E. STEP Social Studies					....	5771
F. STEP Science						....

Table I-8

Regression of Grade VII Criterion Measures on HMF Factor Variables for 213 Students
(Rounded values, decimal points omitted)

HMF Factor Variables	Criterion Measures*					
	Teacher GPA	CAT Reading	CAT Language	CAT Arithm'c	STEP Soc. St.	STEP Science
1. Personal Stability	..	-06	-11	-05	05	..
2. Divergent Thinking	17	10	-07	03	13	20
3. Convergent Thinking	08	39	22	31	35	46
4. Symbol Aptitude	19	24	38	33	14	18
5. Conforming Behavior	20	-08	..	03	..	-03
6. Age-Mate Acceptance	38	14	18	10	14	06
7. Antisocial Attitude	-16	-16	-25	-27	-15	-10
Sums of Squares of Regression, R^2	3649	3252	3368	3421	2517	3638
Multiple Correlation, R	60	57	58	58	50	60

*Distributions of scores for the criterion measures and for the indicators used to compute new stanine values for HMF factor variables were the original stanine scores for the 213 boys and girls in grade VII; thus many of the distributions had a restricted range and thus do not have maximum efficiency either as predictor variables or criterion measures for the students of high mental function (HMF).

Table I-9

Regression of Grade VIII Criterion Measures on HMF Factor Variables

(Rounded values, decimal points omitted)

HMF Factor Variables	Criterion Measures					
	Teacher GPA	CAT Reading	CAT Language	CAT Arithm.	STEP Soc. St.	STEP Science
Boys (N = 53)						
1. Personal Stability	-09	-12	-13	-12	-09	17
2. Divergent Thinking	08	..	..	21	10	-03
3. Convergent Thinking	12	33	06	11	42	38
4. Symbol Aptitude	..	14	45	21	06	-09
5. Conforming Behavior	26	14	15	19	09	14
6. Age-Mate Acceptance	66	28	17	35	31	12
7. Antisocial Attitude	-09	-11	-14	-10	-14	-22
ΣΣ Regression, R^2	4490	3099	3733	4049	3836	2757
Multiple Correlation, R	67	56	61	63	62	53
Girls (N = 49)						
1. Personal Stability	14	05	15	19	10	04
2. Divergent Thinking	15	13	-06	12	21	24
3. Convergent Thinking	07	37	...	38	40	35
4. Symbol Aptitude	39	22	53	13	18	24
5. Conforming Behavior	09	11	-16	27	14	14
6. Age-Mate Acceptance	27	10	18	18	02	-13
7. Antisocial Attitude	-22	-10	-27	-18	-03	..
ΣΣ Regression, R^2	4288	3579	4377	4251	3723	3420
Multiple Correlation, R	66	60	66	66	61	58
Total HMF Population (N = 102)						
1. Personal Stability	03	-02	..	-05	..	11
2. Divergent Thinking	07	10	00	21	19	17
3. Convergent Thinking	04	34	05	13	42	34
4. Symbol Aptitude	29	24	51	30	15	09
5. Conforming Behavior	15	10	..	19	11	14
6. Age-Mate Acceptance	39	15	15	30	15	..
7. Antisocial Attitude	-23	-15	-24	-14	-08	-08
ΣΣ Regression, R^2	3925	3144	3827	4008	3668	2389
Multiple Correlation, R	62	56	62	65	61	49
Gr. VII Factors, R	60	57	58	58	50	60
Gr. VII Indicators, R	75	76	75	68	67	55

Table I-10

Regression of Grade IX Criterion Measures on HMF Factor Variables

(Rounded values, decimal points omitted)

HMF Factor Variables	Criterion Measures					
	STEP Math	CAT Reading	CAT Language	CAT Arithm.	STEP Soc. St.	STEP Science
Boys (N = 53)						
1. Personal Stability	23	-13	..	02	-09	-14
2. Divergent Thinking	06	-06	-12	-03	09	13
3. Convergent Thinking	47	36	36	18	05	35
4. Symbol Aptitude	13	35	49	37	05	21
5. Conforming Behavior	07	..	..	12	-14	10
6. Age-Mate Acceptance	12	12	09	22	19	..
7. Antisocial Attitude	-03	-33	-17	-28	-25	-20
ΣΣ Regression, R^2	3529	4444	4780	3916	3484	3554
Multiple Correlation, R	59	66	69	62	60	60
Girls (N = 49)						
1. Personal Stability	11	06	11	03	07	08
2. Divergent Thinking	16	21	14	19	16	..
3. Convergent Thinking	25	32	..	16	44	43
4. Symbol Aptitude	34	32	61	44	03	28
5. Conforming Behavior	..	06	-10	12	07	14
6. Age-Mate Acceptance	09	15	08	12	08	..
7. Antisocial Attitude	..	-08	-18	-14	-13	...
ΣΣ Regression, R^2	3636	4658	4918	4184	3238	3656
Multiple Correlation, R	60	69	70	65	56	61
Total HMF Population (N = 102)						
1. Personal Stability	17	-03	03	..	..	-03
2. Divergent Thinking	10	10	..	09	16	..
3. Convergent Thinking	45	38	21	19	44	54
4. Symbol Aptitude	19	33	57	39	06	13
5. Conforming Behavior	06	..	03	12	06	12
6. Age-Mate Acceptance	08	16	07	20	13	05
7. Antisocial Attitude	05	-18	-19	-19	-20	-04
ΣΣ Regression, R^2	3604	4113	4587	3783	3080	3794
Multiple Correlation, R	60	64	68	61	56	62
Gr. VIII Weights, R	--	56	62	65	61	49
Gr. VII Weights, R	--	57	58	58	50	60

APPENDIX J

SOCIOGRAPHIC ANALYSES OF AGE-MATE ACCEPTANCE

The analyses in preceding appendixes served to illustrate the part which peer stimulus value and age-mate acceptance played in the explanation and predication of talented behavior among junior high school boys and girls. Qualities or attributes which made for acceptance, avoidance, rejection, or isolation by one's peers entered heavily into most evaluations of school progress by teachers. Moreover, they seemed to have something to do with achievement in the various subject fields as well as age-mate appraisals of talented behavior. What was the nature of group structure in the junior high school years which made expectations and pressures imposed by peers through acceptance and avoidance a significant element to be considered in the study of talented behavior? This appendix was designed to illustrate and, in part, explain what was involved in these phenomena.

A graphic technique was used to represent group structure and to estimate age-mate acceptance among boys and girls in the research population each year. For this report, a series of sociographs showing relations among age-mates was chosen from those prepared from sociometric valuations in community B. The phenomena studied were strikingly similar in every other school location. Figures J-1, J-2, and J-3 were the sociographs obtained from valuations of one another by boys and girls in three elementary schools designated, for convenience, X, Y, and Z. Most of the seventh-grade classes in community B were housed in these schools during 1957-58. During the next year, 1958-59, a large number of the boys and girls from the three elementary schools moved on to one of the two junior high schools, designated as school M. The housing of seventh-grade classes in elementary schools had been necessary until the construction of a second three-year junior high school. Figures J-4 for the fall of 1958, J-5 for the spring of 1959,and J-6 for 1959-60 were sociographic representations of group structure in junior high school M during the eighth and ninth grades. Code numbers for each boy and each girl were kept the same through the series of sociographs.

A standard procedure (Clark & McGuire, 1952) was followed in the construction of each of each of the sociographs represented in the six figures. Sociometric valuations were made by each boy and girl in a school location by having them respond to the pair of stimulus items headed "age-mate acceptance" in Appendix C:

(1) Write below the names of three persons you would prefer to run around with most of the time. What grade is each one in?

(2) Write below the names of three persons you might not prefer to be with most of the time. What grade is each one in?

The names of persons so valued were entered upon the upper part of cards, 8 x 5 inches, one for each boy and girl making nominations. The next task was to transfer all valuations by peers to the lower portions of the card for each of the persons nominated. This was done by members of the clerical staff in the Laboratory of Human Behavior. Entires were made under two headings; namely, PVR or "positive valuations received" and NVR or "negative valuations received."

The next steps in the procedure were the determination of a sociographic sequence and the construction of the sociograph. Each sequence began with the boy or girl who had received highest sociographic score

$$SS = PVR + MPV - NVR$$

where PVR and NVR had the meanings defined above and MVR meant "mutual positive valuations." The number of MPVs could be counted as readily as the PVRs and NVRs on each card since both valuations made and received were entered by name. As shown in the illustrative sociographs, the individuals nominated by the first person in the sociographic sequence were added to the list. In turn, the ones they nominated were added, as illustrated, until a sequence ended. This was a point of major cleavage, a number of which appear in the figures. Then a new sequence was begun with the card of the person remaining who had the highest SS value. After all individuals with positive valuations had been placed in the sequence, those with only negative nominations were added (sociographic level 2). Then the names of isolates, with no valuations, were left (sociographic level 1).

The arrangement of the cards in sequence according to the list determined by the foregoing procedures facilitated the construction of the sociographs. As shown, an "X" was used to denote a positive valuation and an "O" negative valuation. The standard procedure brought the positive valuations close to the diagonal and spread the negative ones farther away. As a consequence, clique structures usually were readily discernible from the graphic portrayal of positive and negative valuations which represented acceptance and avoidance. By and large, as shown in the illustrative sociographs, the clique structures were concentrated in the upper-left quadrant of most matrices. Toward the lower-right quadrant, small groups and pairs appeared most frequently. Within cliques, of course, there were some negative valuations of one another as well as the positive ones.

The next step was that of determining sociographic levels. In each sociograph, level "1" at the bottom was reserved for "isolates" or boys and girls who received no recognition from their age-mates. Level "2" was made up of individuals who received only negative valuations from persons preceding them in the sequence. Since only six sociographic levels could be assigned, some judgment was involved in determining the "break-points" for levels "6", "5", "4", and "3". The usual rule was to make the divisions at points of cleavage where new clique structures began. An alternative was to select a break-point such that individuals lower in the sequence were valued negatively by the persons in the sociographic level above them. Both types of break-points occurred in the six illustrative figures, J-1 to J-6.

Next, the valuations entered upon the sociographs were employed to calculate indices of peer status (McGuire & Clark, 1952) for each boy and girl. The formula for obtaining the index for each subject was

$$IPS = \frac{\Sigma PVR_s - \Sigma NVR_s}{N_m} \pm \frac{\Sigma D_s}{N_m}$$

where PVR and NVR were weighted by sociographic level, *s*, of the peer nominating a subject; D_s was the difference in sociographic levels between the nominator and nominee; N_m was the number of positive and negative valuations directed to the subject, but not less than three, the median number; and the sign (+ or-) of the correction factor was determined by the sign of the valuation factor preceding it. The resulting values of IPS were entered on the right-hand side of the sociograph as shown in each of the illustrative figures.

The resulting distributions of IPS values were regarded as estimates of age-mate acceptance and avoidance within a school location for the year or semester. Sets of IPS values could be compared within and between school locations and from one time to another. This was possible since they were derived by a standard procedure and did not depend upon the number in the population. Distributions of IPS values in grade VII for the total research population, for example, ranged from -9.00 to +6.00 with a mean of 0.70 and a standard deviation of ± 2.70 for those who received valuations from their age-mates.

Figures J-1 to J-6 were derived by the procedures sketched in the foregoing paragraphs. They permitted the identification of both tightly-knit and loosely-organized cliques as well as pairs, singly-valued, and isolated boys and girls at each school location over a period of three years. In other words, the sociographs were representations of group structure and, as such, gave some meaning fo the terms age-mate acceptance, avoidance, rejection, and isolation. In addition, they provided a background for understanding what is meant by the variable, IPS Peer Status, used in the research.

The research team would like to make a suggestion to persons who care to examine the six sociographs closely. Select a boy or girl, or a number of boys and girls, in each of the seventh-grade elementary schools represented by figures J-1, J-2, and J-3. Check to see if they have entered junior high school M by reference to figure J-4. Then follow them through figures J-5 and J-6 to find the continuities and shifts in their relationships with other boys and girls. In many instances, a particular student has the same kind of acceptance throughout the school years. In other cases, there are dramatic changes in acceptance and in associations with other boys and girls. For those who would like to examine other data on the boys and girls represented in the sociographs, the code numbers are the same as those used on each of the IBM data cards and printouts employed in the research. A number of hypotheses could be tested, especially about the transition from the seventh-grade classrooms of elementary schools to a large junior high school, by reference to sociographs J-1 to J-6 and the large amount of information gathered on the students.

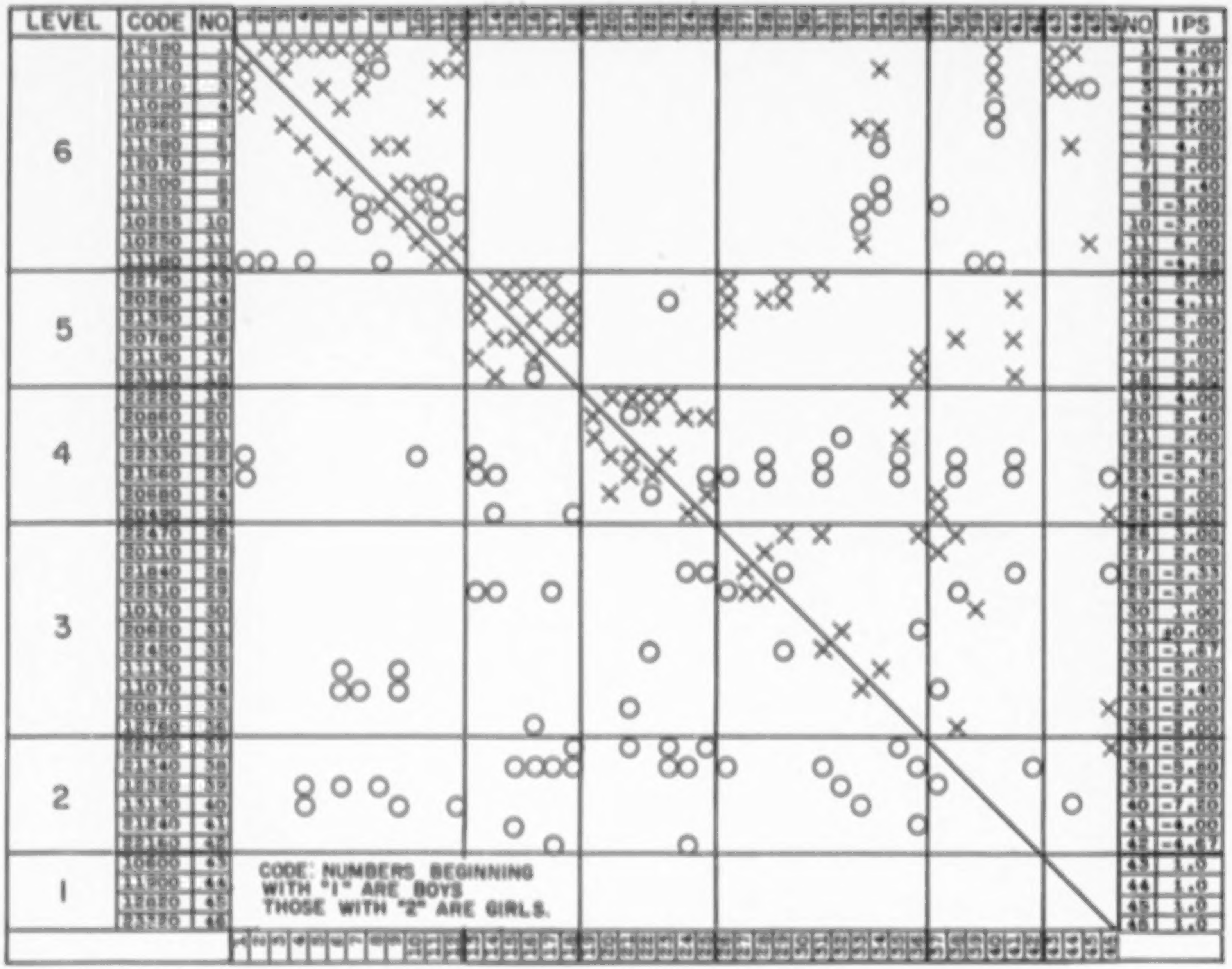

FIGURE J-1 SOCIOGRAPHIC MATRIX FOR GRADE VII (1957–58) IN ELEMENTARY SCHOOL X, COMMUNITY B

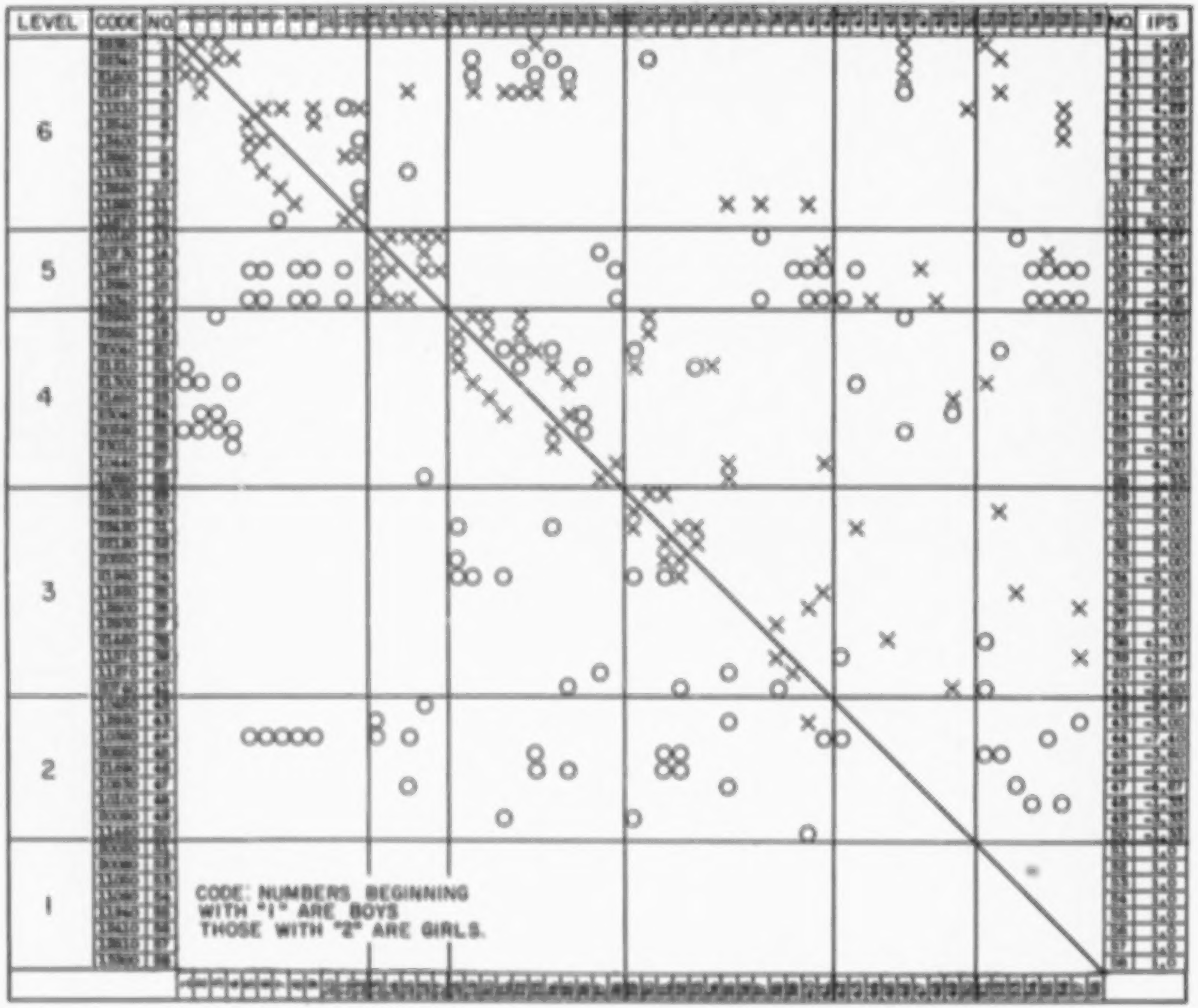

FIGURE J-2 SOCIOGRAPHIC MATRIX FOR GRADE VII (1957-58)
IN ELEMENTARY SCHOOL Y, COMMUNITY B

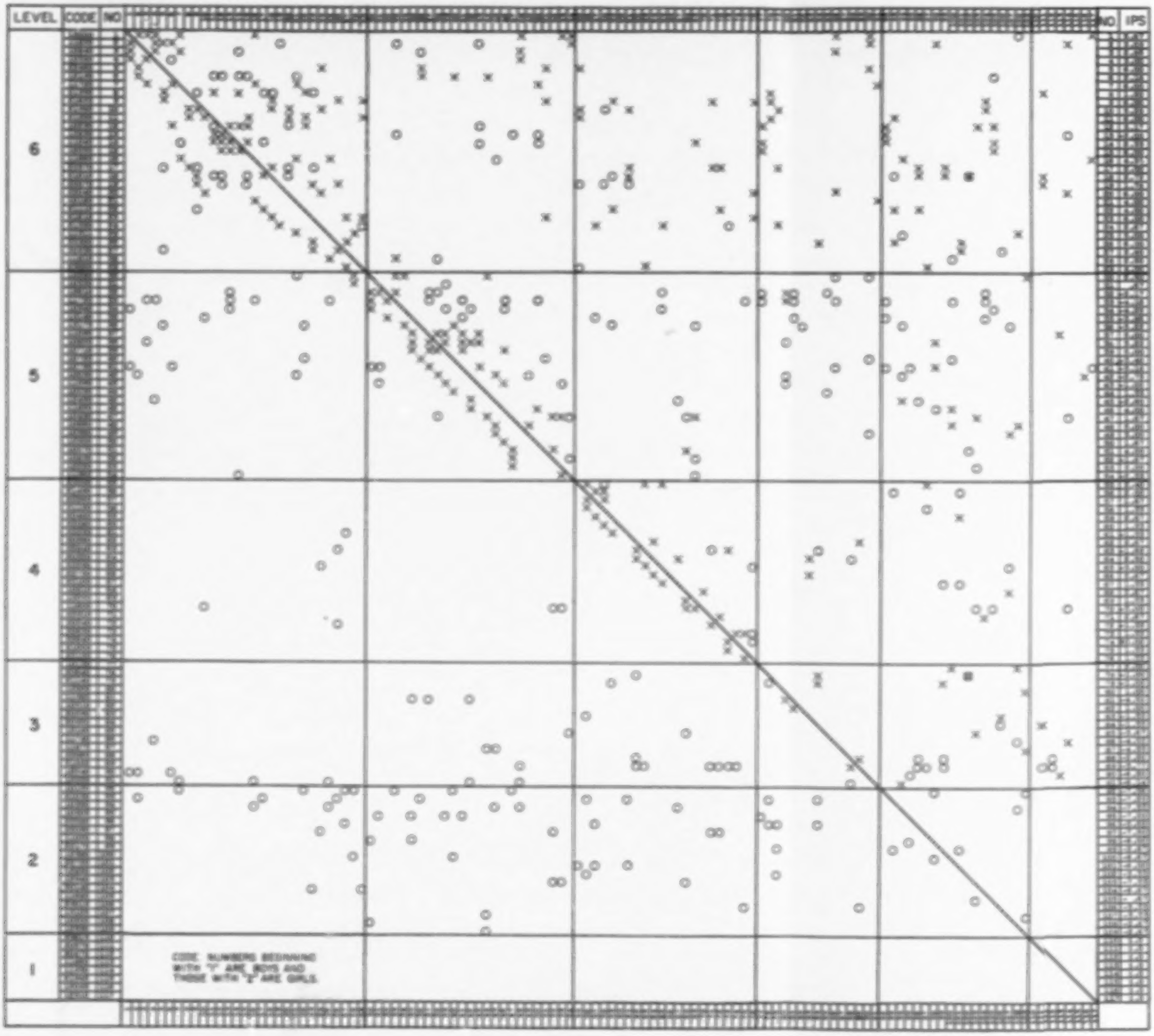

FIGURE J-3 SOCIOGRAPHIC MATRIX FOR GRADE VII (1957 - 58) IN ELEMENTARY SCHOOL Z, COMMUNITY B

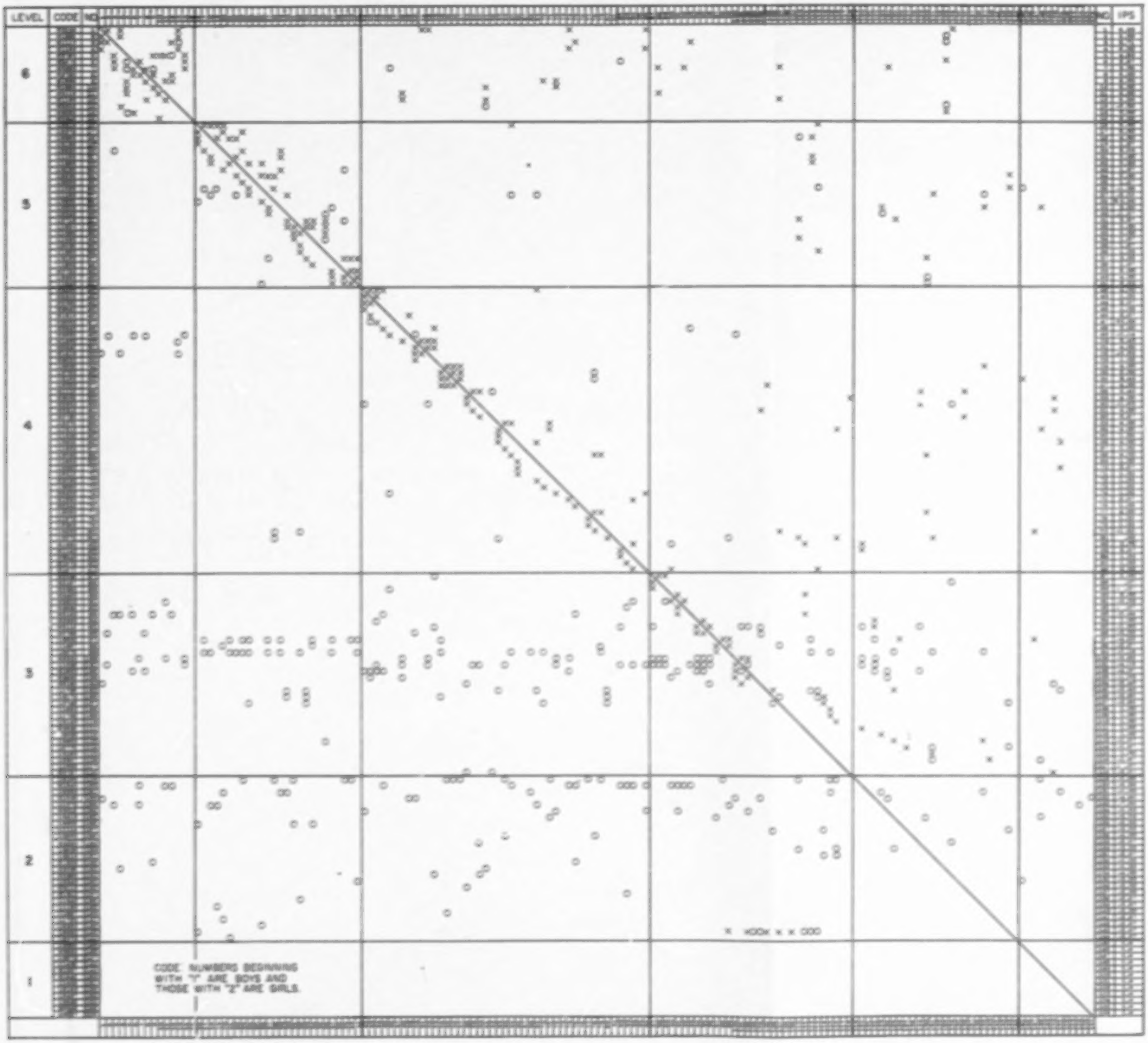

FIGURE J-4 SOCIOGRAPHIC MATRIX FOR GRADE VIII (FALL 1958-59) IN JUNIOR HIGH SCHOOL M, COMMUNITY B

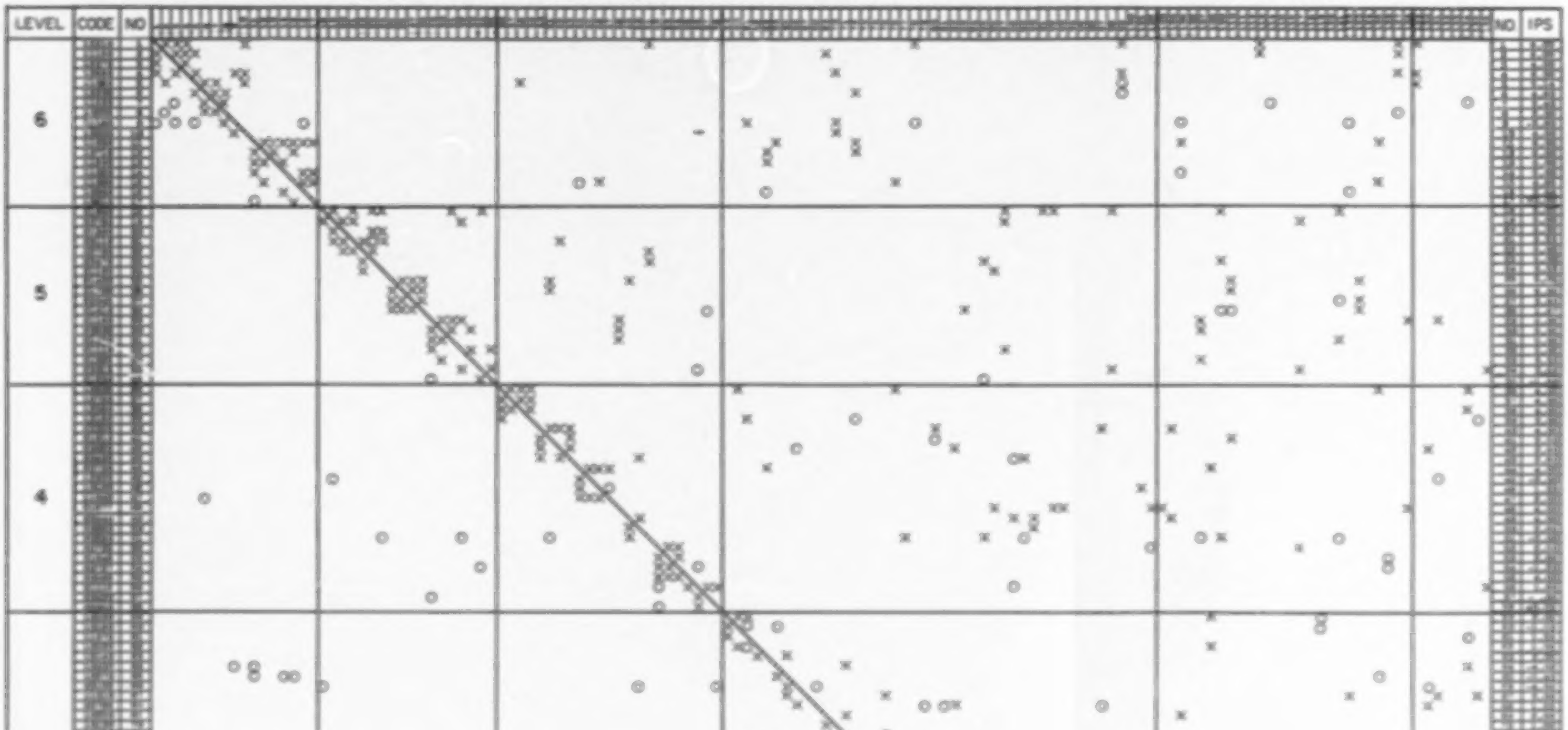

FIGURE J-5 SOCIOGRAPHIC MATRIX FOR GRADE VIII (SPRING 1958-59) IN JUNIOR HIGH SCHOOL M, COMMUNITY B

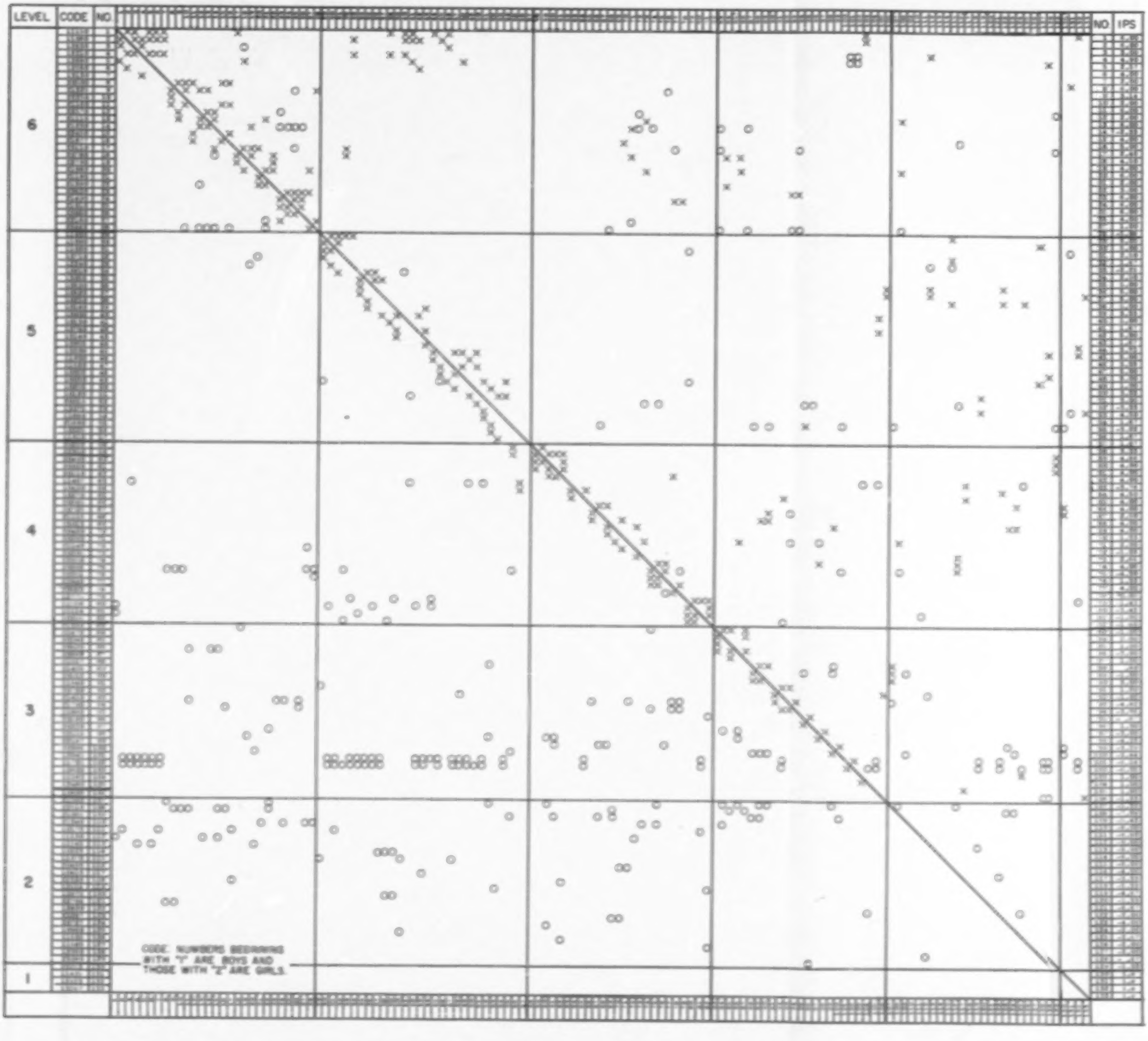

FIGURE J-6 SOCIOGRAPHIC MATRIX FOR GRADE IX (FALL 1959 - 60) IN JUNIOR HIGH SCHOOL M, COMMUNITY B

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